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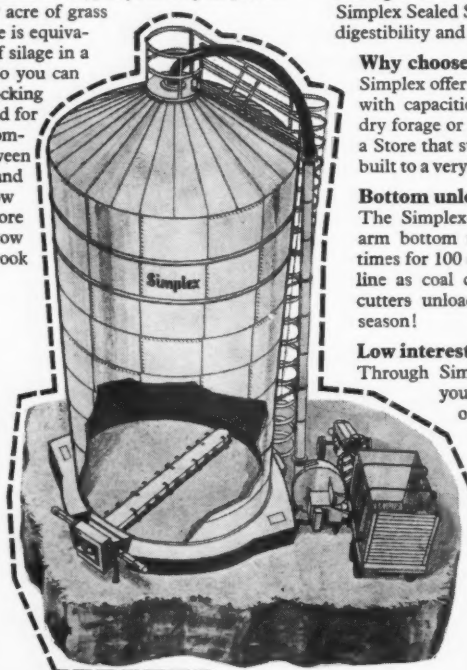
Tower Silos and the Landscape page 552

Save half an acre per cow per year

Simplex Sealed Forage Storage gives more feed, more milk, more meat

For the average farmer, building a horizontal clamp for silage means saying goodbye to a third of the crop. Ruined in storage. On the other hand, if you store wilted forage in a Simplex hermatically Sealed Store you can keep as much as 95% of your crop in perfect condition. Every acre of grass in a Simplex store is equivalent to 1½ acres of silage in a surface clamp. So you can increase your stocking rate or use the land for other crops. Comparative tests between sealed storage and clamp silos show that a sealed store saves ½ acre per cow per year. Take a look at meat production, too. Two beef animals can be fattened per acre at a liveweight gain of 2½ lb per day, to produce 18-month-old fat stock. Farmers working under normal conditions confirm these findings. What's your record?

Simplex Sealed Stores will also store wet grain at peak digestibility and palatability for all stock feeding.



Why choose Simplex?
Simplex offer you a range of over 30 Sealed Stores with capacities from 12,750 to 30,770 cu. ft. of dry forage or 14 to 700 tons of wet grain. There's a Store that suits your needs exactly. And they're built to a very high specification.

Bottom unloading with the rugged Crosscut
The Simplex-Hoy Cross-cut is a unique single-arm bottom unloader giving 25-35 minute feed times for 100 cows. Made on the same production line as coal cutter chains, the high-tensile steel cutters unload easily, even during that difficult season!

Low interest finance for high profit farming
Through Simplex you can have the equipment you need with up to 5 years to pay at only 4½% per annum on equipment costing more than £1,000.

To: R.M.A. Brook (Ref. 13),
Simplex of Cambridge Ltd.,
Sawston, Cambridge.
Tel: 0220 3 3281.

Please let me have all the facts on Simplex Sealed Stores.

Name.....

Address.....

No. of cows..... Acreage..... Tel:.....

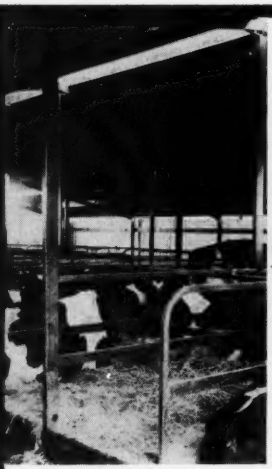
Be sure you talk to **Simplex**

Simplex OF CAMBRIDGE

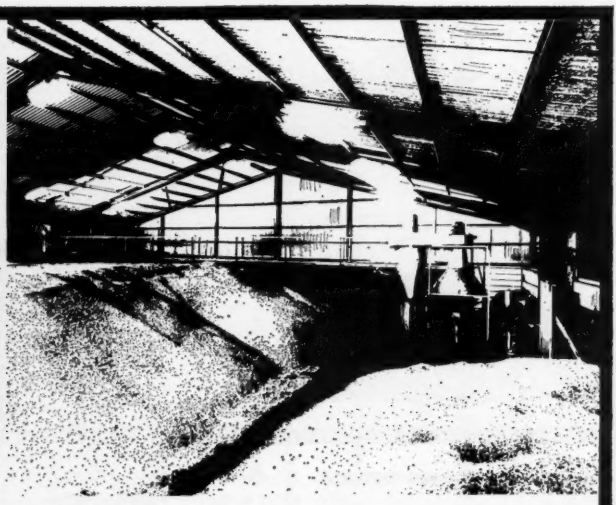
A member of the G.E.C. Group of Companies

STEEL Modern Steel builds the specialised structures needed for stepping up farm efficiency. Steel framed buildings offer maximum strength, durability and adaptability to meet changing needs. Exceptionally wide spans can be provided economically with complete flexibility of design, and difficult site conditions are no problem. Buildings blend with any type of landscape when roofed and clad with new low-cost plastic coated or prime-painted steel sheets. These BSC cladding products give maintenance-saving colour, effectively resist corrosion, and give buildings added strength and value.

Buildings that work better and harder for farm efficiency

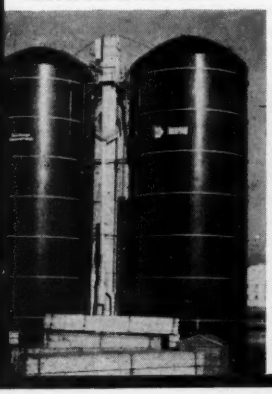


Light tubular steel livestock buildings . .

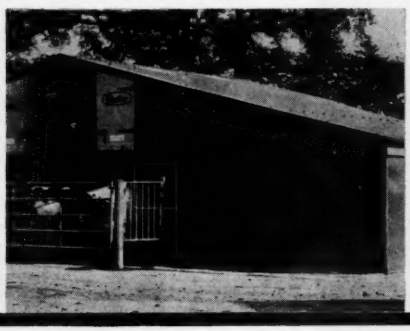


Steel portal frames giving economical clear spans . .

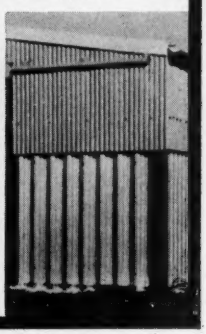
Vitreous enamelled silos . . .



Maintenance-free 'Colorcoat' plastic-coated cladding. Photo courtesy Hosier Equipment (Collingbourne) Ltd.



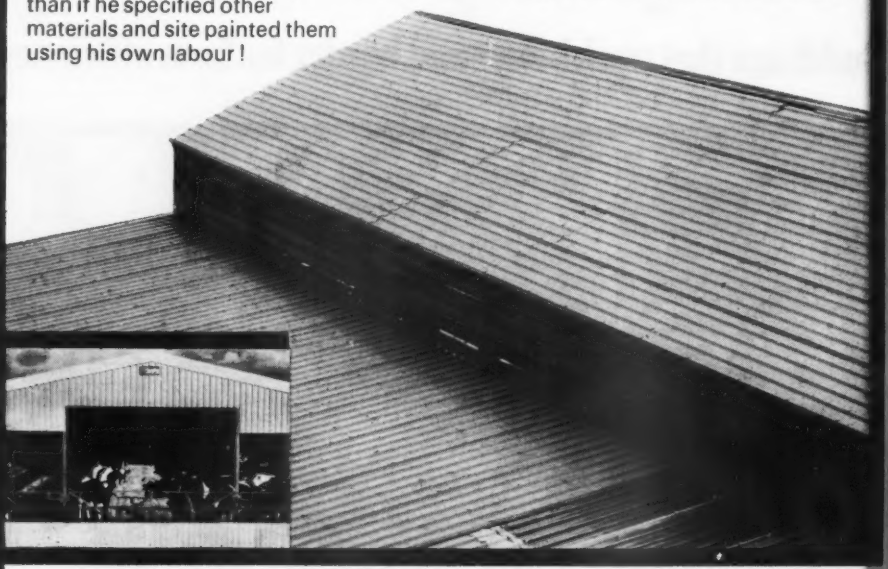
Prime-painted 'Galvaprime' low-cost steel sheet . . .

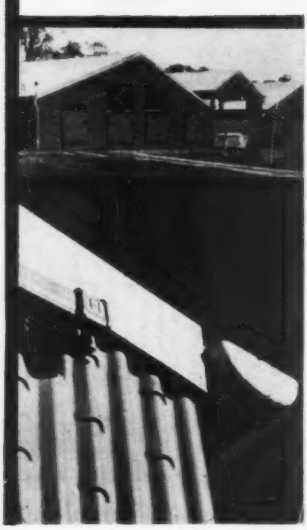


New strong steel sheet roofing and cladding gives INEXPENSIVE COLOUR PROTECTION

Durable, attractive, maintenance-saving colour – plus the strength of corrosion protected steel – AT LOW COST. BSC's colour-coated 'Everclad' gives you a choice of fresh, appropriate farm colours. This modern galvanised steel product provides excellent appearance, durable colour finish, and long-term protection for farm buildings at lower cost than has been possible before.

Prime-painted 'Galvaprime' is a BSC pre-coloured, fully-galvanised steel sheet which gives protection very cheaply, saving *initial* site painting costs. Experience shows that these modern pre-coated steel claddings actually cost the farmer less than if he specified other materials and site painted them using his own labour!





Shatterproof and more resistant to damage in transit, fixing and service, colour-coated steel sheet adds strength and value to farm buildings. Unlike other cladding materials, it is light, needs less structural support and is less likely to damage.

Better looking—better protection. Stronger and more quickly fixed, long and easily handled lengths of pre-coated steel sheet are available so that costs are cut further by minimising overlaps.

Durable coatings. Thick PVC coating or specially formulated paint is applied under controlled conditions assuring excellent adhesion to the fully galvanised sheet. Uniformity of coating and finish are far superior to site painting. **Important — Everclad colour-finished steel claddings are approved for Ministry grant.**

COLOUR RANGE. Specially chosen colours approved by ColD and MAFF help buildings blend with rural settings.

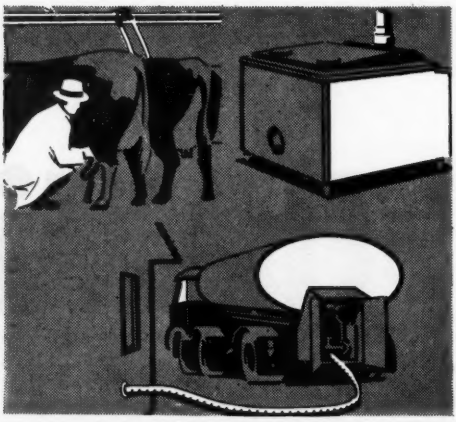
'EVERCLAD' colours—Lakeland brown, Peak grey, Evergreen.

'GALVAPRIME' is available in Country Green

Top left. Maintenance-saving colour. This 'Farm-Pak', 120-cow cubicle building has wall cladding in 'Everclad' plastic-coated galvanised steel sheet. Farm labour can erect low-cost light tubular steel frame Farm-Pak structures. (Farm-Pak Buildings Ltd., Southampton.)

Centre. Attractive. Buildings shown are similarly clad in plastic-coated galvanised steel: the 300-cow 'Cotel' is by Hill Construction Co. (Engineers) Ltd.

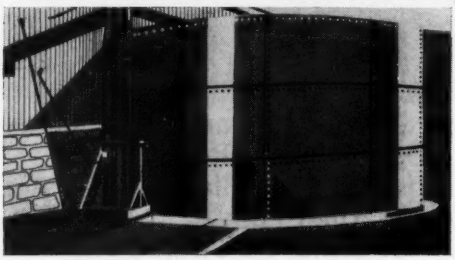
Bottom left. Low-cost colour plus ventilation. 'Ventrex' louvred steel sheet in pre-painted 'Galvaprime' gives weather protection plus ventilation. Air gets in, rain and snow stay out—there is no condensation. Ventrex sheet by Ash and Lacy Ltd., Warley, Worcs.



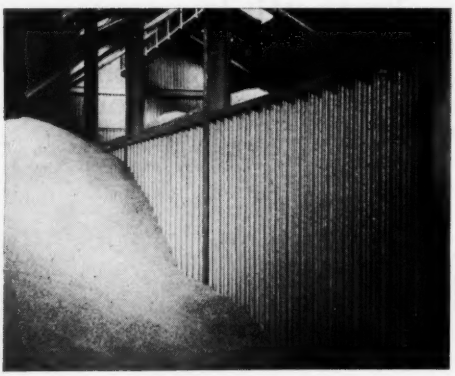
Design in steel

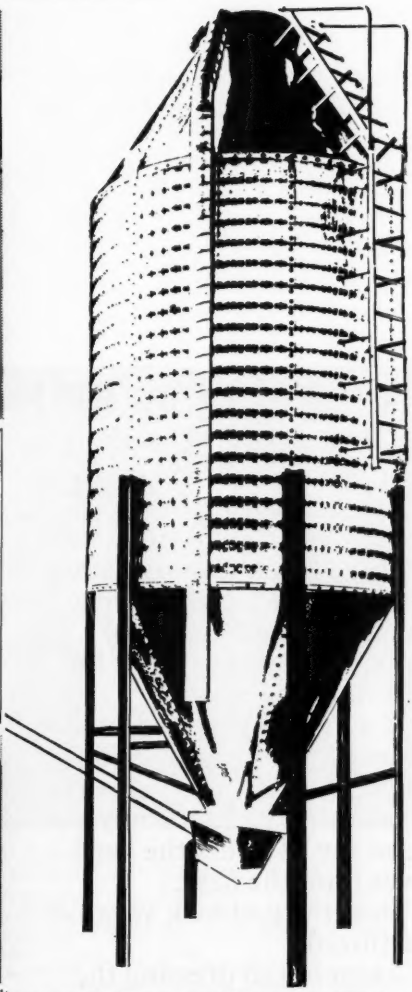
Stainless steel. Bulk milk tank and dairy equipment – for ease of cleaning, hygiene, high strength, in labour-saving milking parlours.

Modern structures that save farm labour



Above. Steel Slurry Tanks–simplify disposal, save labour, built of corrosion resistant vitreous-enamelled steel sheets – which is also used in steel silo machinery. (Boythorpe Cropstores Ltd.).





Top right. Modern pre-fabricated steelwork – keeps costs down. These galvanised all-steel Bulk Feed Tanks for bulk storage of animal food stuffs can be delivered ready to the prepared farm site to save labour and feeding costs immediately, for poultry, pig and dairy producers. (Spiraflite Ltd, Potton, Sandy, Beds.) Main opening page illustration: Economical steel portal frame building with galvanised storage walling – clear spans up to 120 ft or more are not unusual. (Boulton and Paul, Steel Construction, Ltd, Norwich).

Bottom left. Stronger – multi-corrugated galvanised 'Arc-form' panel system for side walling or internal partitioning. Sheet is 38 times stiffer than normal profile. (Frederick Braby & Co Ltd, Bristol 3 – who also supply grain bins as shown on opening page).

Information. Building? Or modernising? We will gladly supply details of relevant steel products for farm structures and a list of erectors of modern, steel-framed agricultural buildings.

British Steel Corporation

33 GROSVENOR PLACE LONDON SW1

The Mi

Or how Tom Shorrock and son get more profits per acre.

Milk, that strengthener of bones and bathtime treat of starlets, is the mainstay of Chapel Farm, Kirkham, Lancs.

Of the Shorrocks' 167 acres, 117 are devoted to their dairy herd, including 26 acres of rough permanent pasture for the herd followers.

38 acres are reserved for paddock grazing for the 70 milkers.

After one paddock has been grazed for 24 hours the herd moves onto the next.

Then the paddock vacated is fertilized.

As an initial dressing the grass gets 3 cwt per acre of 'Nitram' (34.5% N.). Followed by alternate dressings of 3 cwt of ICI No. 2 (22.11.11). And 2 cwt of 'Nitram'.

In all each paddock gets 6 dressings throughout the season.

The cutting fields are spread with 2 cwt of ICI New No. 1 (15.15.21) about mid March. And 2 cwt of 'Nitram' in mid April. After the first silage cut they're then given 3 cwt of 'Kaynitro' 25 (25.0.16) ready for the next cut.

The cutting fields are then boosted with 'Nitram' up to the beginning of September. So the herd can stay out chomping through to November.

Tom and Bryan's fertilizer programme resulted in a satisfying 200 gallons of milk every August day.

Together with a stocking rate of 1.2 acres per cow. And a gross margin of £85 per acre.

Your local ICI representative or ICI merchant can help you profit more from your soil.

The same way the Shorrocks do.

ky Way.



Tom and Bryan Shorrock, farmers.

Tom was born on his father's farm just down the road from where he is now. And his father financed him when he set up independently in 1941.

Bryan, whose main interest is pig breeding, joined his father in partnership in '66.

Tom says, "If anyone wants really good farming advice ICI are the people to get it from."

Tom is an active member of the Rotary Club. He also enjoys shooting.

Bryan's married as well, with a son and daughter. He shares his father's interest in shooting, and is a keen hi-fi enthusiast.

Jack Fairhurst, R.D.A., N.D.D. Reading University. ICI man in S. Lancashire.

His interest in farming grew from holiday jobs that he had on farms. Jack worked on a farm before and after university.

After a spell with the Min. of Ag. he joined ICI in 1946. Jack says, "The farmer's willingness to try out new techniques over the last 20 years has enabled people like myself to develop and extend our knowledge, to our mutual benefit".

Jack is married with 2 grown up children. And his spare time interests are "a conflict between golf and garden."

Mike Ivison, B.Sc. Ag.Chem. ICI representative in mid Lancashire.

Brought up in the Lake District where an uncle has a farm.

After Bangor University worked for a feeding stuffs company. Joining ICI in 1965.

His reasons being, "The variety of the job in relation to farming, and I enjoy meeting people."

Mike, who lives near Blackburn, is married with 2 children who are "currently keeping us awake all night".

He plays cricket for a local team.

ICI **The Fertility People.**

This is a picture of loose smut



This is a grain of barley like any other grain of barley except for one thing. This grain is infected with loose smut.

Drill this grain and the infection will spread up through the plant, kill the ear and infect its neighbours.

Loose smut is now rampant throughout this country and it is estimated that there are infections of up to 12% in this year's harvest. This is a potentially disastrous situation for future barley yields. Remedy? There is one and only one. That is to control the infection in the grain without damaging it. Hot water treatment can do it but has many disadvantages.

The modern treatment is chemical – with Murganic RPB.

Murganic RPB effectively controls loose smut.

Murganic RPB is a combined Vitavax/organo-mercury dressing, which, used on stock seed, offers the safeguards of a mercurial dressing with positive, safe control of loose smut in both barley and wheat. And with none of the disadvantages of hot water. Murganic RPB represents a significant breakthrough in the control of cereal diseases.

Murganic RBP has been jointly developed by

Rothwell Plant Breeders & The Murphy Chemical Company Ltd.

Agriculture

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Editorial Offices
Ministry of Agriculture, Fisheries and Food
Whitehall Place, London, S.W.1.

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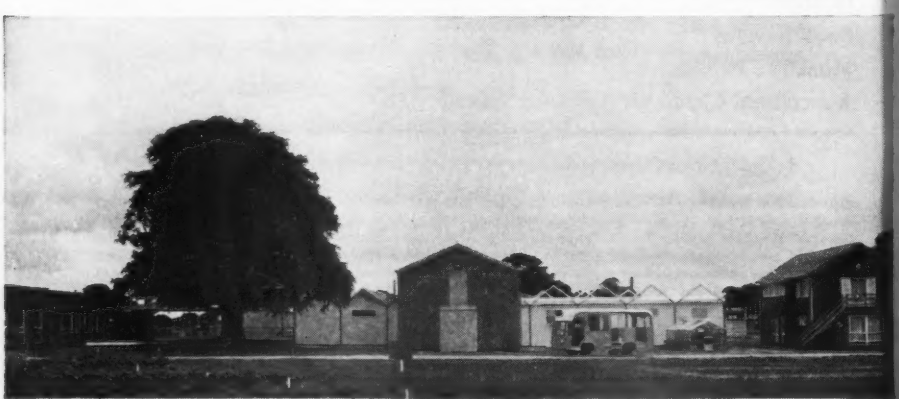
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The Electro-Agricultural Centre for all advisers

This Centre is a permanent part of the National Agricultural Centre at Stoneleigh. It affords a display of fundamental techniques in the use of electricity in agriculture, as well as providing conference and training facilities. In addition, there is a technical and product information library, and adequate provision for demonstrating new equipment.
This Centre has been established by the Electricity Council to help all concerned keep up to date with the latest electrical developments in agriculture. It operates in conjunction with the Demonstration Areas of the N.A.C. where electrical methods are widely demonstrated as part of the many new farming techniques.
Advice and information about electric farming methods is freely available from the full-time specialist staff in attendance. Facilities for training courses and conferences are available for use by recognised agricultural organisations. The Centre is designed to meet the needs of all sections of the agricultural industry and to assist farmers in their efforts to increase productivity and cut costs.

For further information contact your County or Regional Office, or Mr.R.G. Scott at the Centre.



The Electro-Agricultural Centre, Kenilworth, Warwickshire, CV8 2LS. Tel: Coventry 27496/7

Issued by the Electricity Council, England & Wales

AGRICULTURE NOVEMBER, 1969

In this article **H. H. Lawrence, C.Eng., M.I.E.E.**, of the South Eastern Electricity Board, emphasises the need for regular testing and maintenance of electrical wiring on the farm to safeguard against breakdowns in plant or equipment

Farm Wiring

THE Wiring Regulations of the Institution of Electrical Engineers begin by emphasizing that good workmanship and the use of proper materials is essential for compliance with the regulations, and they call for regular inspection and testing of all wiring at specified intervals and whenever additions and alterations are made to the electrical installation.

Modern farmers are so dependent upon electricity that it is vital to take all possible precautions to safeguard against failure of the electrical installation and equipment. Many farmers who have invested capital in modern processing plant will not have enough manual labour to enable them to revert to hand operation if the plant fails. It is, therefore, important that regular testing and maintenance is undertaken to find out weaknesses and allow remedial action to be taken, thus avoiding breakdowns which could have serious consequences.

Electrical installations on farms are subjected to very much wear and tear and because of this there are special regulations relating to farm wiring. This is considered to be so important that a special section of the 14th Edition of the Regulations for the Electrical Equipment of Buildings issued by the I.E.E. in 1966 is devoted to agricultural and horticultural installations.

Testing and inspection should be carried out at least every three years by a competent electrical contractor who is required to issue a certificate stating the condition of the wiring. He is expected to advise the farmer of any defects which are discovered and, if required, quote for carrying out the necessary repairs.

In spite of regular testing, accidents can occur which give rise to damage of the wiring which may then require urgent attention. There are some precautions which can be taken in advance to help in such emergencies. The telephone number and address of the nearest Electricity Board service depot (and of the wiring contractor if different) should be clearly displayed on a permanent label at the point of supply. If the equipment has unusual design features which may give rise to difficulty it is as well to have spares of components which are likely to wear out or, alternatively, to have a working arrangement with a supplier who can give quick delivery at any time.

All switches, fuseboards and controls should be clearly marked to show what they control. The correct rating of fuse should be indicated and spare fuses should be kept at each position ready for immediate use. Cartridge fuses are better, safer and more convenient than rewirable fuses and their use avoids the possibility of the wrong size being used. It is even better to have circuit breakers which, though a little more expensive than fuses can bring about a considerable saving in maintenance costs. However, it is emphasized that wire fuses and cartridge fuses are not interchangeable and that one type should not be used in a box designed for the other type.

It is not possible to over emphasize the importance of employing trained electricians to carry out all alterations to electrical wiring. It is true there are many amateur extensions which appear to work well, but these sometimes have hidden dangers which would only be understood by an experienced craftsman, and it is most unwise for anyone not properly trained in electrical work to interfere with permanent wiring and complicated electrical equipment. It must be clearly understood that special precautions have to be taken with electrical installations on farms, so that there can be no risk from shock or fire. The special Farm Wiring Regulations are designed to give protection against such risks and nothing, however trivial it may seem to be, has been written into the Regulations without very good reason. This makes it important that the Requirements should be carried out in detail.

Correct wiring is most essential and the risk of shock from faulty equipment or wiring is partly due to one of the main supply conductors being deliberately connected to earth. It may appear strange but this connection is really a safety precaution. The wire which is earth is coloured black and called the 'neutral conductor'. The other wire in low voltage supplies (usually 240 volts) is coloured red and is known as the 'live wire' or 'phase conductor'. If by accident a person or an animal makes contact with the live wire a current will flow through the body to the ground or any metal in contact with the earth which may give a painful and sometimes fatal electric shock. It only requires a very small current to pass through the body for a short time to bring about death. It is thus vital that accidental contact of this kind is avoided at all times, and provision has to be made in every electrical installation to detect and immediately cut off the supply whenever there is a leakage of current from the wiring or any apparatus. This is done by a combination of fuses, circuit breakers, earth wires and/or earth leakage circuit breakers. Neutral contacts should not be connected to earth terminals in sockets and plugs. These are essential parts of every circuit and they must be properly installed and regularly tested and maintained in good working order.

There are two usual methods of affording protection against shock:

1. by enclosing the wiring and apparatus entirely with metal casing and connecting all of the metal enclosures with earth so that any leaks pass harmlessly to earth or;
2. by enclosing the wiring and apparatus in an outer protective sheathing of an insulating material in addition to the usual insulation so providing a double safety barrier.

Installations thus fall into two broad categories:

1. metal enclosed construction;
2. double insulated and/or all insulated construction.

When metal conduit is used on farms only the galvanized type is permissible. This is expensive and, despite the galvanizing, corrosion may still occur with passing of time unless great care is taken during erection and afterwards. Black enamelled steel conduit is unsatisfactory in damp and corrosive

situations and is not now approved for use on farms. However, this is a fairly recent regulation and many installations in enamelled conduit may be found on farms which were wired in earlier years and every opportunity should be used to replace it by a more satisfactory system. In a conduit system the many sections of tube are joined together by 'fittings' of which there have been numerous designs in the past. Only a screwed thread fitting can provide the essential good connection needed for safety on farms and even this is not sufficient when the conduit is placed in the vicinity of livestock. In this case an earth wire has to run inside the conduit and connected to all sockets and apparatus as a further safety measure.

In a metal conduit system of wiring every single piece of metal work has to be bonded together (i.e., electrically joined) to provide a low resistance path for any leakage current. If this were not done parts of the metal protection could become 'alive' and dangerous. The problems associated with making and maintaining a good low resistance bond are such that many engineers prefer to avoid the difficulties and instead use the alternative 'all insulated' wiring system. A good reason supporting this choice is that if metal work can be reduced to a minimum so also is the problem of earthing. Even when using an insulated system there is generally a need to provide certain unavoidable earth connections for apparatus; this is done either by installing a separate insulation covered earth wire or by using an earth continuity conductor built into the cable during its manufacture.

Many of the risks from accidental contact by animals with wiring can be avoided by sensibly selecting cable routes out of reach of livestock. In barns and cowsheds it is preferable, easier and often cheaper to run the wiring along the outside of the building close under the eaves and only take the cable into the building at points near to which lights or sockets are needed. This is a method which may be used with considerable ease for rewiring or extensions.

In no circumstances should main switches be left on if there is need to remove earth wires for alterations, or when plumbing repairs are being carried out which may result in breaking bonds between metal work. Exposed earth wires should be of armoured construction to prevent any risk of mechanical breakage and identified by securely attached warning labels.

Changing economic conditions bring about fairly rapid changes in farming policy and buildings may be used for purposes quite different from those for which they were first equipped. This invariably means alteration to the electrical installation from time to time and it is advisable to maintain an accurate record of the circuits together with a detailed diagram of connections. This will save many hours of tracing wiring at future dates and will also be of considerable aid when emergency repairs have to be made.

It is most important that the intake position and mainswitch is readily accessible at all times, because it must be possible to switch off electricity without delay in an emergency; this cannot be done if the switchgear is obstructed by machinery, stacks of fertilizer, drums of oil and similar stores.

If a fuse fails or a circuit breaker trips the reason must be established. These occurrences are often the first warning of trouble developing and must not be ignored.

The fitting of a larger fuse is rarely the correct solution unless some mistake had been previously made as regards the proper size. Rewireable fuses can deteriorate and it is far better to use cartridge fuses or circuit breakers which give constant performance.

Should the handyman be tempted to carry out minor jobs for himself the following points must always be observed. All flexible cables and wandering leads must have tough rubber sheathing to withstand wear and moisture, and they must be as short as possible consistent with the convenient use of the equipment. Cable couplers can be dangerous in farm situations and should not be used to make leads longer. Sockets near to the working positions is the best solution which enables leads to be kept reasonably short.

All lampholders should be insulated and of the skirted and weatherproof pattern. All socket outlets must be of the switched type. It is not sufficient to rely upon pulling out a plug to switch off aparatus, because plugs suitable for farm wiring are secured firmly to prevent water getting into the terminals and cannot be removed as quickly as domestic plugs.

Lamps should be switched off before they are changed to ensure that there is no risk from shock if the glass breaks due to corrosion at the lampholder. If lamps are in watertight or weatherproof fittings it is important to take special care to see that the seal fits properly when the cover is replaced. Seals in lamp covers are prone to damage after some years and will need special attention if they are in any way distorted.

Broken switch and socket covers must be replaced as soon as discovered. Putty, chewing gum, sticky tape etc., are not suitable repair materials for broken accessories.

Any suggestion of even the mildest electric shock calls for the immediate attention of a skilled electrician. Electricity is very safe when the wiring is properly maintained, and unskilled persons are well advised not to meddle with installations. All users must appreciate that they have a responsibility for ensuring that their electrical installations are safe at all times and this necessitates regular inspection by competent electrical contractors.

P. R. Peachey, a County Agricultural Adviser in the National Agricultural Advisory Service asks: **Is there a place for**

Grain Maize in Southern England?

DURING recent years, in those parts of the country where cereals are grown quite intensively, the hunt for break crops has been on. Discussions have ranged far and wide over the whole subject of the profitability of intensive cereal growing in the south and south-east of England. Usually the main answer emerging has been better husbandry to avoid perpetuation of disease from one season to another; to handle land at the right moment, to not only

control weeds but also to hold and improve its physical condition. Further north and east somewhat less has been heard of these discussions and this is to be expected in parts of the country, where potatoes, sugar beet, vegetables for the quick freeze, and fresh markets are well established. All of these crops are of high value and the land receives corresponding attention and treatment.

Break crops

The extension of these crops to the South and South-east is not at all straightforward. The absence of sugar beet factories is obvious. In the case of potatoes, apart from growing for processing such as crisping and canning, the further extension of the acreage would depend on the potential of expertise, soil, competition in the market and availability of quota. Similar strictures apply to vegetable crops, especially when the market has not been organized and small surpluses result in disaster for the growers.

For these reasons, other break crops which fit in easily with cereals and do not significantly increase the overhead costs of labour or machinery, have received attention. Field beans fall into this category and indeed some impetus has been given to them by Government subsidy. Experiment has shown some improvement in yield and freedom from disease in the following cereal crop where beans are used as a one-year break, but that is about all. In practice, they play no direct part in controlling perennial grass weeds and their potential yield still seems elusive. Weather too, is inimical both to the timely sowing and harvesting of the spring varieties, and chocolate spot disease of the winter varieties in the more southern areas is a menace. The degree of selectivity demands accuracy in the application of herbicides for beans, and black aphis infestation is an additional hazard in the spring crop.

Oilseed rape suffers too, in much the same way as field beans. Economic yields* are difficult to obtain and control of perennial grass weeds can only be attributed to normal husbandry rather than to the crop itself and the market outlet for the oil is subject to many variable forces. It also is at the mercy of insect and pigeon attack and the weather can put the crop at great risk at harvest especially if direct combined.

Linseed is another crop which does not control perennial grass weeds, and even if the price is right, satisfactory yields are difficult to obtain and to harvest.

Herbage seed does little to eradicate some of the important cereal diseases and may even worsen the perennial grass problem. Nor is the market for the seed dependable, year in year out. An unhappy picture, despite the useful gains to be made purely by better field husbandry of the cereal crops themselves and the promising advances in the control of mildew.

An alternative

However, the situation is not hopeless, as our Continental neighbours, France and Germany, have found out by increasing rapidly their acreages of grain maize. In England, the acreage of maize has steadily increased over the past four years, on the strength of its performance and continually increasing potential as a producer of starch equivalent per acre, either as grain or silage. This performance and potential give it a place in its own right as

*DENCH, J. A. L., University of Reading, (1969). *Oil Seed Rape—Financial Results of 1968 Crop—Interim Report.*

well as having strong claims as a break crop. Such claims are superior in many respects to the crops discussed above, and they have been mentioned by Milbourn* who gives a map which indicates those areas in Britain suitable for growing maize grain. The opportunity to clean land before sowing and the use of atrazine makes it a more effective crop for grass weed control than other cereals. Experiments are in progress to investigate the killing effect of high doses of atrazine on couch grass in maize and they look promising. This may involve double cropping with maize. Maize is little troubled by the common cereal diseases and it avoids the sowing and harvesting labour peaks of traditional cereals.

The hybrid varieties currently in use are much better able to grow in the climatic conditions of Southern England than any available before and breeders have others in the pipeline which will be even better suited and earlier to harvest. North-eastern France, where the crop has now reached 250,000 acres has an annual rainfall of 2 in. less than the English south coast and total sunshine (May—October) of about 50 hours more. The total summer months (May—October) mean accumulated day degrees above



Taking a critical look at the harvested crop during the Maize Development Association's demonstration at Hurst's Gt. Domsey Farm, Essex in November, 1968

50°F, average 1,656 for N.E. France, whereas they vary form 1,635 at Kew to 1,409 at Wye and 1,623 at Ryde. How critical are these differences?

The Maize Development Association reported that over 235 acres on ten farms in 1968, an average yield of 38·2 cwt/acre at 15 per cent moisture content was achieved. The average yield of all crops grown in England in 1968 is not known but it is likely that it was less than this figure. However, commercial crops of over 40 cwt/acre have been achieved where experience has been gained and put to good use.

The husbandry of maize growing is straightforward and well known and suitable soils and areas can be prescribed. Clays and heavy loams are not advisable. Harvesting is no longer a problem with the advent of the header type of machine which takes only the cobs from the crop through the harvester, and with the wide tyres of the modern combine, damage to soil structure is much less than occurs when bulky crops such as sugar beet or potatoes are being carted off. The crop is fairly weatherproof and can be harvested over a much longer period when ripe than the other cereals. In

*MILBOURN, G. M., Wye College—*Maize for Grain—A Grower's Handbook.*

1968 when lodging was very common in barley and wheat, it stood up very well. In fact, it seems to take gales of at least 70 m.p.h. to lodge it.

Drying

The biggest difficulty of growing maize is the drying that is necessary to reduce the moisture content to 16 per cent. Where grain can be harvested at 35 per cent moisture content the damage to the grain is small and excellent samples for feeding can be obtained direct from the combine without further cleaning. In recent years, crops in southern England have been harvested in the range of 35–45 per cent moisture content. In France it is commonly dried in one pass over a batch drier, whereas in England it has usually been taken over the drier twice to avoid cracking. The fuel cost including electricity to do this is in the region of 70*s*.–80*s*. per 40 cwt of dried grain, e.g., per acre.

Investigations carried out on the Isle of Wight indicate that grain as harvested can be preserved with propionic acid for at least eight months without deterioration, and its use as stockfeed is quite acceptable. When crushed or rolled it will keep much longer than would be necessary for feeding. At 35 per cent moisture content, $3\frac{1}{2}$ gallons acid per ton of grain has been used, but more critical levels of usage should result from further trials. This method, comparable in cost with drying is advantageous to the grower who wishes to feed grain on his own farm or for the neighbour-to-neighbour sales. Whether merchants will be prepared to handle grain treated in this way is speculative at the moment, but if its use became widespread, good commercial sense would see that it was transferred from the site of production to the point of use.

The implications

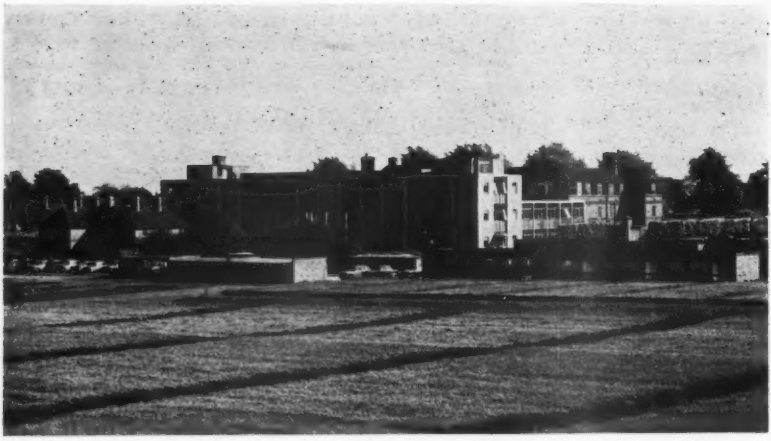
There is little doubt that as experience of suitable areas and husbandry is gained, maize will find a place in southern England both as a break crop and in its own right as a producer of coarse grain. As breeders produce strains for earlier harvesting, the possibility of following maize with winter wheat will improve. At present, however, with harvesting in early November, wet weather following may prevent this on the heavier soils, but such land should be only a small part of the acreage in maize. In Northern France wheat behind maize is sometimes broadcast and rotavated in with the trash at the same pass and two wheat crops often follow four or five continuous maize crops. Not least of all, it could replace some of the $3\frac{1}{4}$ million tons of maize imported annually, mostly from hard currency areas and alleviate the home-grown barley surplus problem.

'At the Farmer's Service' 1969/70

A wealth of information of interest to farmers in England and Wales is contained in the latest edition of 'At the Farmer's Service'.

This handy, pocket-sized booklet, issued annually by the Ministry of Agriculture, Fisheries and Food, describes the many services and facilities provided by the Ministry and gives details of the grants and subsidies which are available to farmers and growers. It also contains the addresses of the local offices of the Ministry and of other agricultural organizations.

Copies can be obtained, free, from the Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex HA5 2DT, or from any of the Ministry's Divisional Offices.



N.I.A.B. Headquarters building with 1959 extension and part of the 200-acre trial ground

Fiftieth Anniversary of the N.I.A.B. (1919-1969)

F. R. Horne **D. S. Kimber**

CO-ORDINATED crop variety testing was the call of Professor T. B. Wood of the Cambridge School of Agriculture, addressing the Farmers' Club in 1912. About the same time, independent surveys by Sir Rowland Biffen at Cambridge and Sir George Stapledon at Aberystwyth, showed that much inferior seed was being used on the farms. Shortages of food in the First World War gave emphasis to problems of unreliable seed, and lack of information about varieties led to the proposal of Sir Lawrence Weaver of the Food Production Department in the, then, Board of Agriculture, to establish a National Institute of Agricultural Botany.

Weaver's appeal was warmly supported by the industry and the Trust Fund brought in £45,000, of which nearly half was contributed by the Seed Trade Association, the British and Irish Millers, and the National Association of Corn and Agricultural Merchants; the other half coming from Weaver's own subscription list including handsome gifts from a leading East Anglian farmer, Sir Frederick Hiam and from Sir Robert McAlpine. The Government provided financial support with a grant of £24,000 and a loan

of £22,000. On 13th January, 1919, only two months after the cessation of hostilities, the Trust Deed setting up the Institute was signed at a meeting held at the Food Production Department in Victoria Street, London.

Howe Farm was chosen, just across the Huntingdon Road from the University Farm, for the original trial ground of forty acres and the attractive headquarters building. This was designed by Morley Horder, a friend of Weaver who was intensely interested in architecture, and in 1959 laboratories and lecture rooms designed by Cowper and Poole were added around a central courtyard.

Tests to determine the immunity of potato varieties to wart disease had been started in 1913 at the instigation of a district inspector, John Snell, who succeeded in obtaining classic results under very limited facilities in the workhouse garden at Ormskirk. This work was brought within the N.I.A.B., at the request of the Board of Agriculture, and an Ormskirk appeal provided funds for the purchase of Dark Lane Farm where potato variety testing was centred from 1920 until 1940. The Board also delegated to the new Institute the administration of the Official Seed Testing Station. This had been started under R. G. Stapledon in Victoria Street, London, fourteen months before the Institute was established, and it was transferred to Cambridge on the completion of the headquarters building in 1921.

It was shortly after this, in October, 1921, that King George V and Queen Mary visited the new buildings. Forty-eight years later the Institute was honoured in its Jubilee year by a visit from Her Majesty The Queen as Patron.

The first Director, W. H. Parker, formerly an assistant of Biffen, guided the Institute through the first nineteen years and for five years during the Second World War, Dr. H. Hunter, Director of the Cambridge University Plant Breeding Institute was Acting Director of the N.I.A.B. The present Director was appointed in 1945.

Variety testing

Experiences gained by Dr. E. S. Beaven, Sir Daniel Hall and Professor T. B. Wood in their *Pilgrimage of British Farming* undertaken between 1910 and 1912 clearly had an influence on the early deliberations of the N.I.A.B. Council, of which all three were founder members. A study of the Swedish system of regional variety testing by Biffen, Stapledon, Weaver and other Council members in 1921 so impressed them that they worked towards a similar ecological system of trials in this country. Harper-Adams and Seale-Hayne Agricultural Colleges accommodated N.I.A.B. trials from the early twenties, as did the Norfolk Agricultural Station, then moving to Sprowston. These three centres still number among the present fourteen regional centres, but the load of work has vastly increased and they now have resident N.I.A.B. Trials Officers—a far cry from those early days when headquarters staff had often to travel to the centres to drill, record and harvest.

Some of the early trials of oats and sugar beet were financed by the Royal Agricultural Society, which has given valuable support to the Institute throughout. In 1921, when the Royal Show was at Cambridge, the Institute had demonstration plots occupying $1\frac{1}{2}$ acres. Since the permanent site was established at Stoneleigh, the N.I.A.B. plots have become a prominent part of the National Agricultural Centre, being used both for demonstrating and for disease recording.

Performance in different regions

Climate and soil surveys have been studied during the past twenty years in an attempt to define regions where particular varieties do best. Some diseases are more important in certain areas and the Institute makes specific recommendations of *Rhynchosporium*-resistant barley varieties and ringspot resistant brassica varieties in the South-west where these diseases are common. But trial results so far suggest that it is more rewarding to match variety to conditions rather than to geographic regions. The performance of crop varieties at different nitrogen levels and times of drilling is being investigated in an endeavour to establish which varieties are likely to be consistent in behaviour from region to region and from one season to another. It should be noted that Cappelle-Desprez and Dr. Bell's Proctor, which have done more than most varieties to raise yields of wheat and barley, are notable for their wide adaptability rather than for suitability to a particular region.

England and Wales are the most northerly limit for the cultivation of many crops. Winter oats, winter barley and winter beans are not grown in the North and the N.I.A.B. Regional Centre at Edinburgh, run in conjunction with the East of Scotland Agricultural College, is able to provide valuable information on the relative winter hardiness of varieties which may not be apparent every year in trials further south.

The purchase of Hill Farm, Lolworth, in 1947, enabled the Institute to grow seed for cereal trials under comparable conditions and meanwhile to obtain preliminary comparisons between varieties grown in commercial size plots.

Resistance to diseases

When Biffen bred the rust resistant wheat, Little Joss, he thought breeders could eventually eliminate losses from yellow rust altogether. Pathogenic races had not then been recognized and it is a sobering thought that recent tests have shown this old variety of 1908, although susceptible to some of the new races, still to be outstanding in its yellow rust resistance.

The Physiologic Race Survey, around which the plant disease work at the N.I.A.B. has been re-organized since 1967, is endeavouring to identify new races of disease as they appear. Breeders, including the British Association of Plant Breeders and plant pathologists throughout Britain have given most valuable co-operation in this work. New races of yellow rust and mildew have been identified in their early stages of attack in both 1968 and 1969, but tests to establish their virulence and relative economic importance have still to be completed.

Recommended lists

Farmers' Leaflets introduced in 1930 gave purely descriptive accounts of varieties tested by the N.I.A.B. and this form is still followed for some of the crops.

The first Recommended List of winter wheat varieties was issued in 1944 and such lists now cover winter and spring cereals, potatoes, sugar beet, field beans and the main species of grasses. Each list is reviewed annually and new varieties are added if they show some improvement on those already recommended. Relative yields, disease resistance, field characters and quality of the recommended varieties are compared to help farmers in choosing the right variety for their particular needs.

Since its formation in 1946, the N.A.A.S. has co-operated closely in crop improvement work by undertaking trials on farms to supplement the N.I.A.B. Trial Centres so that results from some 60–70 trials may be available by the time that varieties are considered for general recommendation. The Recommended Lists are widely accepted by farmers as an authoritative guide and many breeders claim that the commercial success of a variety is determined by whether or not it is listed. The lists have become of even greater importance with the introduction of plant royalties.

Development of vegetable variety testing

Plant breeding at the Cambridge Horticultural Station under D. Boyes and at the Seale-Hayne Agricultural College led to the introduction in the 'thirties' of new Brussels sprouts and winter cauliflower varieties. But there were no facilities then for national vegetable trials, as there were for the main agricultural crops, so breeders had to make the best arrangements they could with growers and with the County Horticultural Superintendents. Vegetable trial techniques were studied just before the War but it was not until 1956 that field vegetables became a regular item in the Institute's trial programme. Only last year the work was further extended to include glasshouse vegetable crops.

Difficulties with synonyms, changes in cultural techniques and the wide range of modern marketing requirements have brought special problems for the vegetable breeder. But the high value of the crop, and intense competition from abroad, make it all the more important that growers can obtain reliable advice about vegetable varieties. The Vegetable Growers' Leaflets now cover nine different crops.

N.I.A.B. fellowship

Communication between growers, seedsmen and the Institute has been greatly fostered by the Fellowship Scheme introduced by the N.I.A.B. Council in 1921. Fellows not only obtain current information about varieties but the Institute is able to benefit from the experience gained when these varieties are grown on a large scale. The aim of the Institute is to introduce an element of flexibility into variety testing to make sure that new needs can be met.

There are now some 5,000 fellows who are regularly kept in touch with latest developments by means of newsletters, Farmers' Leaflets and other publications. Meetings and discussions are held at regional centres as well as at Cambridge. Experimental work can easily become separated from practical realities and the Fellowship Scheme is able to play an invaluable part in ensuring that N.I.A.B. workers have their feet firmly on the ground and that there is an effective twc-way exchange of information.

Reliable seed supplies

Valuable local varieties like Montgomery, Cornish Marl, Essex Red Clover and Kent Wild White benefited greatly from the certification schemes begun by a few pioneers in the 'twenties'. It was due to L. E. Cook at the N.I.A.B. and Gwylliam Evans of the Welsh Plant Breeding Station that the lessons learnt from these local schemes were widely applied during the intensive food production campaign in the years 1939–45. Around Salisbury and

Lincoln, H. C. Gregory, Henry Burtt and other leading farmers and seedsmen developed herbage seed growing so that Aberystwyth S.147 and S.172, S.23, S.24, S.100, S.48 and later Scotia, became household names greatly to the benefit of British agriculture.

It was the experiences gained regionally in providing reliable seed stocks that led, in 1954, to the establishment of the National Certifying Authority for Herbage Seeds and contributed to the international scheme started in 1958 under the Organisation for Economic Co-operation and Development (then O.E.E.C.).

Cereal seed stocks at the end of the War often contained a mixture of varieties. With the active help of the N.A.C.A.M. a Field Approval Scheme was established in 1947 providing one of the best examples of co-operation between the Institute and the seed trade. Under this scheme representatives of seed firms and organizations are trained at Cambridge and, in spite of high examination standards, more than 2,000 inspectors have become qualified inspectors of seed crops.

This scheme has led to a vast improvement in the reliability of cereal seed stocks and more than 50 per cent of seed requirements in England and Wales are now being met from this source. Not the least value of this Scheme has been to bring back to Cambridge a first-hand impression of the problems met in multiplying and distributing new varieties. Seed trade inspectors have also been able to appreciate at first-hand the basic philosophy behind the Institute's motto 'better seeds, better crops'. Cereal Field Approval Schemes started also in Scotland in 1952, and since 1968, a joint British Cereal Seeds Scheme has been developed to give common standards throughout Britain.

Improving seed potato stocks required a different approach and in 1944 the N.I.A.B. set out to demonstrate the value of virus-tested seed in the seed growing areas. Applying the glasshouse techniques developed by Redcliffe Salaman and Kenneth Smith at Cambridge, a new and reliable source of stock seed was made available in post-war years for the seed certification schemes in co-operation with the Ministry Departments in Northern Ireland and Scotland.

From the beginning, the N.I.A.B. undertook the multiplication of approved varieties from the Cambridge University Plant Breeding Institute and other official breeding stations. When plant variety rights were introduced following the 1964 Act, it was recognized that this service could not be maintained by the N.I.A.B. in its capacity as an impartial authority on crop variety tests. After consultations with the Ministry of Agriculture and the Agricultural Research Council, a National Seed Development Organization was formed to deal with the exploitation of Government-bred varieties.

International contacts

The importance of good overseas links was recognized when the N.I.A.B. took a lead in establishing the International Seed Testing Association at a conference held at the Institute in July, 1924. Since 1945, these links have been extended to cover aspects of crop improvement.

For the naming and registration of new cultivars (varieties) the International Commission for the Nomenclature of Cultivated Plants was set up in 1952 with the N.I.A.B. represented on the Committee. The code of nomenclature has proved of great value in establishing the index of varieties in this country following the reports concerning the Qualitative Control of Seed

(Horne Committee 1950) and later in the Committee for Transactions in Seed. It has also provided a basis for the protection of new varieties of plants both in this country and in the newly-formed international Union for the Protection of Plant Varieties (U.P.O.V.).

Crop variety trials in Western Europe were co-ordinated for the first time with the establishment in 1950 of the European Barley Committee in which the N.I.A.B. has actively participated. The publication of 'Barley Varieties E.B.C.' also sponsored by the European Brewery Convention, provided the first universally accepted means of identifying barley varieties moving in international trade, with the Director as chairman of the authors' committee.

At the International Grassland Congress held in Pennsylvania in 1952, grassland specialists from all over the world drew attention to the multiplicity of terms used to describe certified and other grades of herbage seed. The N.I.A.B. was invited by the O.E.C.D. (then O.E.E.C.) to undertake a survey and to propose terms acceptable to member countries. In 1956 the O.E.C.D. Seed Scheme was introduced and the N.I.A.B. has acted throughout the past thirteen years as the technical co-ordinating centre for the twenty-six participating countries associated with the O.E.C.D. or with the Food and Agriculture Organization of the United Nations (F.A.O.).

These international contacts have been important not only through the contribution the Institute can make to world food problems and international trade, but for the benefits derived here from the experiences of Commonwealth, European and other countries.

Close and effective co-operation with so many sides of the agricultural industry at home and overseas has indeed been vital to the Institute's work. The N.I.A.B. owes a great debt to all in this country and abroad who have already co-operated so willingly in its efforts over the past fifty years to increase the production and quality of food crops through improved varieties and better seeds.

National Diploma in Agriculture until 1973

The National Agricultural Examination Board has agreed to a request from the Department of Education and Science to extend the period of the N.D.A. examination until 1973, with resits in 1974, instead of phasing it out in 1970/71 with the expected introduction of OND and HND awards.

Bulb onions can be grown successfully in Britain. J. D. Whitwell, N.D.H., of Kirton Experimental Station, discusses in detail production in the Eastern Region of Britain, of

Bulb Onions (Part 2)

Chemical sprout suppressants

Maleic hydrazide (30 per cent) will prevent sprouting throughout the normal storage period (September to March) if applied at 4 pt per acre in 70 gal water when 15–60 per cent of the onion tops have fallen to the horizontal position. The chemical costs just less than £2 per acre. After application, the onions should be left for 5 days before windrowing.

Harvesting and handling into store

The first harvesting operation consists of cutting beneath the onions just below the bulb, lifting them out of the ground and depositing them on weed-free soil a little to one side of their growing position. A number of machines are capable of carrying out this function, such as the Reynolds windrower, the Rumpstadt onion harvester and elevator-type potato diggers. Growers and farmers adapt other farm implements to do this work, such as the old Leverton pea cutter and modified inter-row cultivators. The windrows may be left quite wide (3–4 ft) and then narrowed in to fit the width of the lifting elevator, but the widths of the windrows are generally determined by the intake of the harvester used.

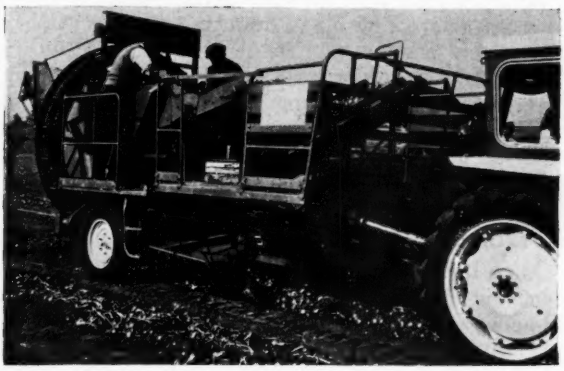


Onions in windrows ready for lifting and removal to bulk store for drying

The onions are left for 7–10 days in the windrows so that the drying winds and sunshine wither the green tops and intensify the colour of the bulbs. Should rain occur during this period it is beneficial to move the onions by passing them over an elevator to prevent skin-staining. After this treatment

the windrows are lifted and the onions delivered into trailers for dispatch to the store. Any one of a number of potato harvesters are suitable to do this work with or without modifications.

When filled, the trailers travel to the store and for a quick turnround are tipped into a tipping elevator fitted with a soil extractor which separates the very small onions and any remaining trash or clods from the ware sample. The dry, clean bulbs pass from the soil extractor to a portable elevator which deposits them in the store to a height of 8–10 ft over lateral air ducts.



Lifting onions from the windrows with a modern high output harvester

Storage in buildings

In farm buildings with a good concrete floor, onions can be stored successfully from September to March to a depth of 8–10 ft over lateral air ducts. It is preferable, but not essential, to have an insulated building and, provided there is adequate height to the eaves and reasonable space above the onions to the ridge, and the building is watertight, existing farm buildings will be good enough for a six-month storage period, but it would be desirable to seek professional advice on design, in relation to lateral thrust.

Such a building can be fitted with grain drying equipment to the following specifications.

The main air duct should have an internal cross sectional area of not less than 1 sq. ft for every 2,000 cu. ft per minute of fan capacity at 1 in. water gauge. The lateral ducts leading off the main duct should have a cross section of about 130 sq. in. when up to 30 ft long, and should be spaced at 3 ft centres when the onions are 8–10 ft deep.

It is suggested that the air flow should be 100 c.f.m. at 1–1½ in. water gauge per ton stored for a capacity of up to 200 tons. The airflow may be reduced to 75 c.f.m. per ton for stores between 200 and 500 tons capacity, and down to 50 c.f.m. per ton for a storage capacity of over 500 tons.

At Kirton E.H.S. we have worked during the last four years on an airflow of 200 cu. ft per minute per ton and there is evidence to suggest that airflows of this order are desirable.

Drying the onions

Once a convenient quantity of onions has been loaded into store, drying should take place immediately. This process usually takes 3–5 days dependent on the condition of the bulbs. The principle of drying, is to blow a high

volume of warm, dry air with a relative humidity between 65–75 per cent (and certainly no less than 60 per cent) through the onions until the outer scales deepen in colour, become crisp and dry and the tops wither to the consistency of raffia paper. During the process the temperature may rise to between 75–80°F but temperature is not so important as maintaining a relative humidity above 60 per cent to avoid splitting the skins of the onions.

Heater banks are usually fitted to the fan units to provide heat in stages. At Kirton E.H.S. the drier has heater banks which provide 250, 500, 750 and 1,000 B.t.u.'s per hour per ton of onions stored. During the drying process it is an advantage if air blown through the onions can be re-cycled back to the fan as this helps to raise the temperature and still maintain the humidity round about the 65 per cent level. When starting the drying process it is an advantage to raise the temperature slowly. This is done by first blowing ambient air through for a few hours and then putting the heater banks on at intervals until the temperature reaches the maximum at which a reasonable humidity can be held.

Treatment after drying

Once the onions are dried they remain in a dormant state and during the remaining days of September and throughout October it is only necessary to blow warm, dry air through them at intervals. Air above 60°F will help to colour the skins of the onions, so the fans are put on again to blow ambient air through the stack when temperatures and humidities are satisfactory.

At the end of October it is necessary to lower the stack temperature gradually and this can be achieved by blowing ambient air through the onions when the temperature is 3–5°F below the stack temperature. This usually occurs at night and in order to take advantage of the coolness of the night air a differential thermostat can be fitted into the stack of onions to operate the fan whenever the stack temperature is 3–5°F higher than the ambient temperature.

This process continues from late October onwards and by the end of November the stack temperature should be in the lower 40s F and by mid-December in the mid to upper 30s F.

Skill is needed to lower the stack temperature and at the same time to keep the onions dry. Ambient air should *never* be blown through the stack when it is warmer than the stack temperature.

Onions freeze at 30·1°F but they will tolerate slight freezing provided they are not handled in the frozen state. Even when the temperature of the onion stack is at 32°F, heat evolution is equivalent to 1,000 B.t.u.'s per ton per 24 hours.

Curing

In addition to drying, better-coloured onions can be obtained by subjecting them to a further period of high temperature and high humidity. American research suggests 75°F and 75 per cent relative humidity for a period of up to 20 days (ref. Cornell Extension Bull. 116, *Curing, Storing and Inhibiting Sprouting of Onions* by Isenberg F. M. and Aug, J. K.). Recent results of research at the National Vegetable Research Station, Wellesbourne, tends to support this. However, at Kirton E.H.S. we have had no difficulty in achieving good colour with normal methods, and if storage is intended to cover the period from September to March, it is doubtful if onions produced on silt

lands require this treatment. However, this may be a method of producing onions to a colour specification, and investigation at experimental level is required to determine its value under British conditions.

Warm temperature storage

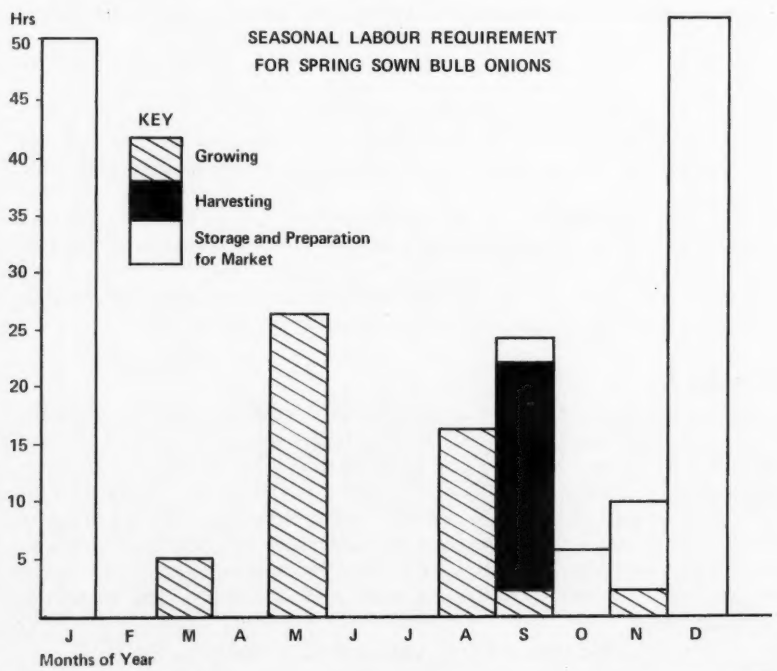
More recently it has been noted that onions remain dormant for long periods at a storage temperature of 70°F, and this raises the possibility of long-term storage in warm temperatures rather than cool ones. Economically it may be cheaper to store at 70°F in properly insulated buildings with air re-circulation than at 34°F, but this system still requires critical examination at research and experimental levels.

Refrigerated storage

Information from the Department of Scientific and Industrial Research indicates that for keeping after February it is necessary to cool the onions to 34°F and store at a relative humidity between 70 and 75 per cent.

Costs of production

Material costs, which include seeds, fertilizers and chemicals, are approximately £45 per acre, and if a 12-ton crop is taken as average, a further £21 can be added for the cost of electricity for storage and drying, and £16 for red cotton nets at 8*d.* each. This brings the total variable costs, excluding labour, to £82 per acre.



Labour requirements vary according to the location of the farm and size of the unit. At Kirton E.H.S. the following labour hours have been recorded per acre on a 5-acre unit of commercial onions. Man hours 124½, woman hours 67 and tractor hours 21½. The cost of this labour is approximately £71 per acre. The labour profile is shown in histogram form on p. 543.

Seasonal labour requirement

	J	F	M	A	M	J	J	A	S	O	N	D	Total
Growing			5		26			16	2		2		51
Harvesting									19				19
Storage and Preparation for market	50								3	6	10	53	122
Total	50		5		26			16	24	6	12	53	192

The system of growing and harvesting at Kirton was fully mechanized, i.e., windrowers and elevators for harvesting and tipping elevators and soil extractors and elevators for delivery into store. The onions were elevated to a topper on removal from the store, passed over a grader and finally bagged off into 56 lb nets.

Material costs and labour amounted to £153 per acre, and the 12 tons of ware onions were removed from store in good condition and realized £18–£20 per ton on the farm, with no carriage or marketing charges to pay, which gives a gross return of £216–£240 per acre, leaving between £63 and £87 per acre to cover depreciation on machinery and buildings, rent and profit margin.

The cost of moving onions into store, drying them and holding them to December, then topping, grading and bagging, is approximately £7 per ton, which means that well-dried, clean-skinned graded onions from store should command a net price of £20 per ton to make storage worth while, because reasonable undried samples will realize £12 per ton off the field.

Conclusion

Bulb onions can be grown successfully in Britain and sold economically at a lower price than imports. To do this, expertise is required to choose the best soil types, and to grow and finish the crop to provide a well-dried, clean-skinned sample, which can be graded accurately and presented in the best possible way. A specialist approach is needed to improve the image of the British onion, so that buyers will realize they can purchase a reliable sample at lower prices than imported ones. This specialist approach should be applied to growing, harvesting and artificial drying, and marketing organization.

Bulb Onions (Part I) appeared in the October issue.

Farm Buildings



In a valley situation, a dark colour for the silo suits the landscape, but in this case as on most other sites the finish is rather too dark. If the functional requirement could have been met by one higher tower rather than two shorter ones, the greater vertical emphasis would have been increased with advantage to the group, the added height being seen from this point against the dark woodland. A single tower would also avoid some of the attachments which confuse the silhouette. Two sets of lettering are excessive and a single line of lettering reading as a band would look better. But each site has to be analysed from all points of view and a series of adjustments and compromises made to find the optimum selection of factory made parts.

This feature, on housing the large dairy herd and tower silos in the landscape, contains articles by:

- ★ **N. M. Spink, A.R.I.C.S., F.L.A.S.,** who is a Senior Assistant Land Commissioner with the Agricultural Land Service in the North Riding of Yorkshire and
- ★ **J. Noel White,** the Deputy Director for the Council of Industrial Design.

Housing the Large Dairy Herd

N. M. Spink

NEAR Scarborough on the North Yorkshire coast is a dairy unit which is unique in the way in which problems of housing, feeding and milking a large dairy herd have been overcome. Whilst there are many units that have interesting features, it is doubtful if there is another commercial unit in this country where so many points of interest can be found on one site.

Background

Manor Farm, Lebberston, comprises 240 acres but with other land nearby forms part of a total acreage of 550 farmed by Messrs. G. E. Frank and Son. Extensive alterations were made to the fixed equipment at their Lingholme Farm some three years ago and, when completed, attention was turned to Manor Farm. The Guernsey herd there was kept in a byre with 70 standings, and it was decided to increase it to at least 180 cows with followers. This was to be done without an increase in the labour force, so milking had to be planned for a parlour and all feeding had to be automatic. As the increase in stock numbers would diminish the straw acreage, housing the cows in cubicles was also a consideration.

Overall layout

At an early stage the advisory services of the Ministry were consulted and discussions were held on both policy and alternatives of layout. It was decided that the shell of the existing cowhouse should form a herringbone parlour and collection area, but the only other existing buildings to be used would be two sealed tower silos erected some years previously. The position of these buildings determined the site of the new housing and feeding areas but, in the siting of these, care had to be taken to ensure they were capable of future extension.

A large single-span building contains the new stockyards, and this is divided internally for different types of stock. It immediately adjoins the new parlour unit as well as the tower silos, to which have been added an additional silo, and the two other new structures are a lean-to adjoining the parlour used as a dairy, and a steel bin for concentrates.



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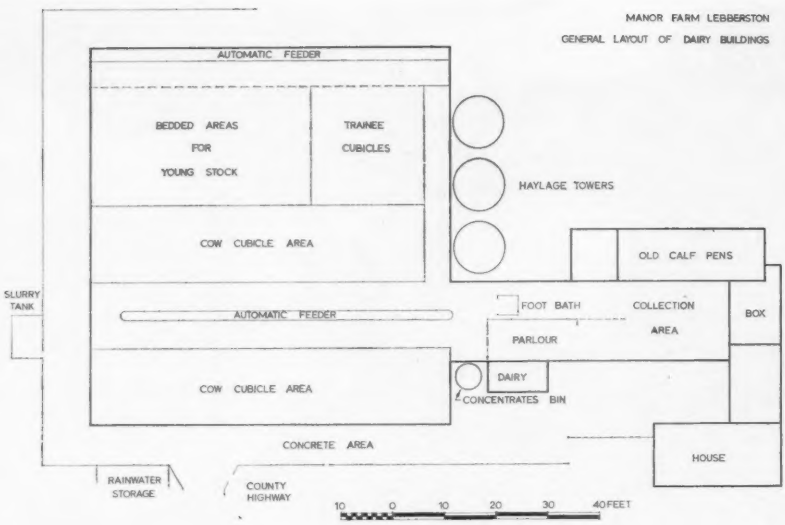
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Conversion of byre

The siting of the parlour within the shell of the byre was determined by the positioning of the dairy to give good access for the bulk milk tanker, and allow a straight walk through for the cows from the collection area through the parlour and back to the housing and feeding area. The provision of a tubular rail down the centre of the collection area encourages correct cow movement; a doorway near the exit of the parlour allows diversion of cows requiring attention, and a footbath at the entrance to the collection yard can be used when necessary. A box has been made at the end of the collection area which could house a bull on this site immediately adjoining the cows.

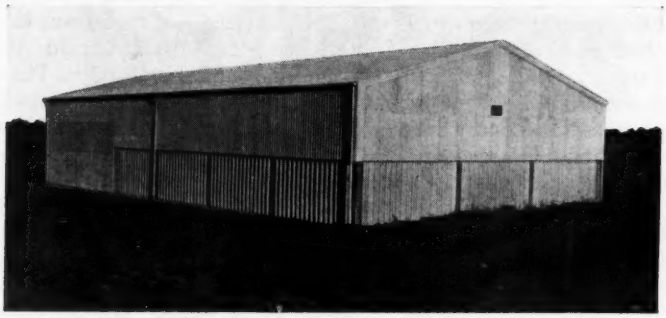
The aim is for at least 120 cows to be in-milk at any one time, therefore, a 16-stall, 8-point herringbone parlour (a two-man unit) was chosen. Because there was insufficient headroom for a feed loft, a 14-ton external concentrate bin was sited nearby from which the feed is augered to the parlour hoppers. Good working conditions are obtained by the use of fluorescent lights and an extractor fan which keeps the temperature in the parlour fresh and cool.

Accommodation of stock

The single-span building measures 120 ft x 140 ft in length in 7–20-ft bays. Approximately half this area is occupied by 184 cubicles and a feed manger. A 5-ft high, 9-in concrete block partition wall divides the cow accommodation from the young stock which are housed in three sections. One of the sections has 54 trainee cubicles for heifers, and the remaining two are strawyards for the younger stock. The young stock area has its own feed manger.

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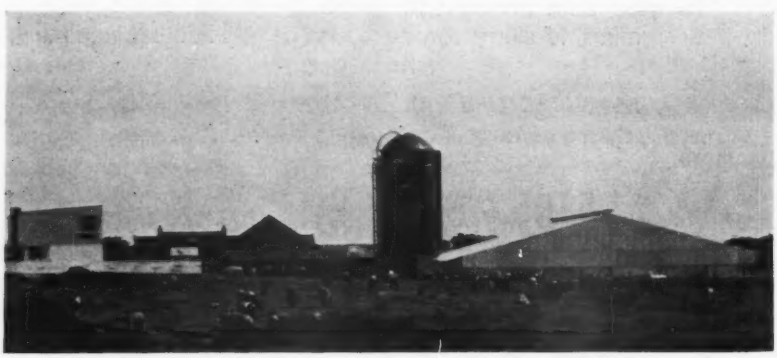
Design of cubicles

Detailed discussions took place with the Agricultural Land Service on the precise design of the cubicles and, although the herd is of Guernsey cows, it was agreed that the cubicle design should take into account the possibility of adaptation for a larger breed, as well as permitting the cows to be comfortable and so encourage their proper use. The total length of the cubicle is 7 ft 4 in but head and breast rails prevent the cows going too far forward. After trial and error, the present effective length of the cubicles is 4 ft 5 in. The tubular steel divisions are at 3 ft 8-in centres and the 9-in high concrete curbs form an impervious heel-stone. The cubicle beds are made with box muck topped with sawdust and filled level with the heel-stone, the warmth from the contents being an additional encouragement to their use.

The floor of the building is concreted level throughout so that complete gutting of the internal fittings would provide a building suitable for any alternative use which a change in farm policy might demand. This is one of the basic points that has been borne in mind in the planning of the unit. The design of the trainee cubicles is similar but with slightly reduced dimensions.

Feeding arrangements in the yards

Three silos of 1,050 tons capacity provide haylage for both cows and young stock. Top unloaders discharge down to the cross conveyors leading to the two floor-level mangers—a single-sided one for the young stock and a double-sided one for the cows. The manger conveyors are of paddle design and the 120 ft length of manger has been found adequate for the cows, as the stock is fed four times a day.



Manor Farm, Lebberston

Slurry disposal

Rainwater from the roof is stored in two waterproofed old concrete clamp silos before being used for washing down slurry from the passageways through grids and by means of an under-floor drain to an outside below-ground tank. From the tank it is pumped out daily through irrigation pipes on to the fields. The main pipes are laid underground, and above-ground extensions allow slurry to be spread on any of the fields on the farm. A combination of

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Controlled environment

From their experience with cows in cubicles at Lingholme, Messrs. Frank decided that a complete controlled environment should be installed in the new unit at Manor Farm. They had suffered from severe reductions in milk yield following drops in air temperature, as well as ill effects on cow health, which they considered resulted from ammonia gases from a slurry tank within the cow cubicle building, and as they proposed washing down the passageway they considered the additional humidity would be one more adverse factor.

The roof and sides of the framed building have been insulated; the fresh air inlet is baffled above the 5-ft high block walling around the building, and foul air is drawn out at the ridge through fans which are automatically set to come into operation when the temperature reaches 60°F. The roof of the old byre is also insulated.

Messrs. Frank are convinced that it is as a result of controlled environment their herd is extremely healthy, and that their milk yield never fluctuates; at a cost of £13 per cow unit they consider it well worth while.

Cost

As the byre and two silos already existed, it does not give an accurate picture of the case merely to list the actual expenditure recently incurred: but assuming all the work had to be carried out at 1968 costs, total charges would be approximately £42,000 gross, the equivalent of £155 for each of the 270-cow units. An economic evaluation gives an actual charge of £14 18*s*. gross per cow unit from this expenditure. This has been based on the following economic lives:

6 years for the towers and equipment
15 years for electrical insulation and cubicles
40 years for the shell of the building

A rate of interest of 8 per cent plus 3 per cent sinking fund has been taken and allowance for repairs and insurance as well as the Farm Improvement Scheme grant in reaching the above costings. However, tax allowances have not been taken into consideration.

Conclusions

Much interest has been shown in this efficient and labour-saving working unit, but there is a further point which will certainly attract an increasing degree of attention in all farm units. The outside appearance of these farm buildings is large, modern and up to date, but it also blends in well with the surroundings and countryside. This is a feature that should be remembered when planning any new buildings, large or small.

Tower silos and the landscape

J. Noel White

Tower silos have become controversial both from the point of view of cost-benefit analysis and of their appearance in the landscape. Although efficiency is not unrelated to their appearance, my present purpose is to discuss this latter problem and describe some of the steps which are being taken to provide a reasonable basis on which an appropriate choice can be made.

Much prejudice has grown up concerning structures which give a vertical emphasis in the landscape, approbation being reserved for Gothic towers, windmills and eighteenth century follies or an occasional shot tower (not in the landscape) round which the preservationists rallied before the Festival of Britain in 1951. Consequently pressure has been put on the Minister of Housing and Local Government to bring within planning control agricultural structures over 40 feet. When this had been done the Ministry of Agriculture invited the Farm Buildings Advisory Panel of the Council of Industrial Design to examine the situation and make recommendations.

The view of the CoID panel concerning agricultural structures in the countryside has always been that the major problem is obtrusive and shapeless bulk in the landscape rather than relatively slender vertical features. Having studied the silo in this context the Panel concluded that the vertical tradition in the English landscape could satisfactorily be extended to include the tower silo, provided particular care was taken not to site it in close competition with other vertical features of a different character. Similarly, care would be needed in grouping together silos on the same site and in selecting colour finishes for them which would be compatible with the landscape. In such cases the Panel recommended that professional advice should be obtained and the planning authority be consulted.

On the other hand, tower silos could in some cases make a positive contribution to a group of farm buildings by providing a focal point to an otherwise nondescript collection of shedding. More often than not the silos are not objectionable on the grounds of height although there were other aspects which called for improvement. For example, chutes and ladders are frequently attached to silos in a clumsy way which destroy their simple outline (see photograph on p. 545); structure linking the silo to neighbouring buildings is often cumbersome and the junctions inefficient. From the farmer's point of view, therefore, the problems relating to silos are first and foremost whether a tower silo is the correct equipment for his enterprise, then what form in terms of dimensions will control the proportions of the tower, and what materials will decide the apparent colour in the landscape.

Form

I believe that the farmer should adopt a positive rather than a negative attitude to the introduction of a silo into the landscape. The attitude that

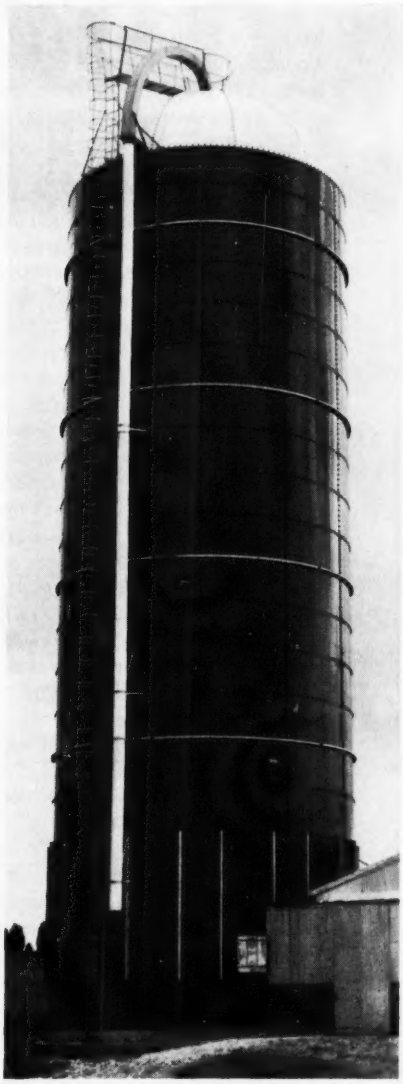
silos can make a contribution to a group of buildings and, indeed, sometimes to the rural scene, is likely to produce better results than the assumption that they are a necessary evil which it is not worth while fussing about. The success of the positive approach, however, depends on recognizing that the difference between a successful structure in the landscape and a regrettable intrusion may hinge on obtaining the right advice at the right moment. If the farmer accepts that some advice will be needed, it would then be prudent to explain to the appropriate advisory officer of the Agricultural Land Service that the intention is to meet, to the maximum extent, the requirements of both function and amenity. I am sure that the Land Service will be helpful in defining the extent to which costs relating to amenity can be covered by grant, and also at what stage and on what aspects of the problem the local planning authority could usefully be consulted, quite apart from any statutory requirements. One of the critical points will be the height of the silo, about which positive arguments for height rather than bulk can be applied—see CoID report on tower silos*—and another will be the siting in relation to other buildings and the landscape. The CoID report is quite explicit that where a silo is to be sited within half a mile of an existing vertical feature, particularly church towers and spires, then the Planning Authority should be consulted. In most cases the planners will try to be realistic and constructive, and if they have doubts about approving the project they will seek the advice of the Land Service before making a decision. Closely related to decisions on form and siting are the visual problems of materials and colour of silos as seen in the landscape.

Colour and materials

The finish of the materials from which the silos are manufactured is a basic factor in the range of colours available to the farmer, and by the time the economic and functional requirements have been decided, the choice may be narrow. But where there is a choice it is important that the most suitable decision is taken. The first step is to observe whether the silo will most frequently be seen by the majority of people on roads and paths, against the darker tones of a valley or against the lighter background of the sky. Obviously for the valley situation a darker colour or a mid-grey is preferable, and against the sky a light grey is better. In many situations the silo may appear partly against the land and partly against the sky; in that case a medium grey or a colour at the darker end of the spectrum would be more satisfactory than a very light colour (see photograph on front cover). Among these farm buildings the silos provide an appropriate vertical emphasis within the group. By good management or good fortune the silo in the foreground, being a mid-grey concrete is seen from this standpoint half against the sky and half against the light roof of the large prefabricated building whose bulk is conveniently broken up by the silo. The roundness of the silo, in contrast to the angularity of the large sheet building, is emphasized by the indented freize just below the aluminium cap which itself matches the sky. The silo in the middle of the group is seen wholly against the landscape and is conveniently dark. This method of storage in tower silos can be kinder to the landscape than the addition of more bulky buildings.

*Available from the author at the Council of Industrial Design, 28 Haymarket, London, S.W.1. Price 4*s*.

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PEOPLE WHO KNOW BUY CROPSTORES

In the publication *Farm Buildings and the Countryside*,* produced by Her Majesty's Stationery Office and sponsored by the Ministry of Housing and Local Government, and of Agriculture, the Welsh Office, the Council of Industrial Design and the Countryside Commission, a range of colours suited to these two situations is listed. They are based on the recommendations of a Research Committee of the Institute of Landscape Architects in 1965.

The National Forage Tower Council has recently asked the CoID Panel to examine the relationship between the industrial finishes of existing silos and those colours which are considered compatible with the landscape, and then to discuss with them the existing finishes which in the Panel's view conflict with the requirements of amenity. The Panel is, therefore, co-operating with Mr. Alex Hardy of Newcastle University in testing the existing colour finishes in a variety of landscape situations to assess their acceptability. It is also hoped to recommend other colours which would be suitable, so that manufacturers will be able to study a limited range of colours which have been measured against landscape requirements.

When this analysis has been done and suitable colours suggested it would be useful to bring the farmers and landowners together for a discussion with the manufacturers and the planners. It is particularly important to obtain some concensus of opinion among the planners and the amenity societies, because it is unreasonable to expect farmers to paint silos special colours to comply with a local planning requirement; nor can manufacturers produce silos in a wide range of colours so that planners and farmers can match the structure to the landscape like curtains to carpets. On the other hand, it is quite reasonable for planners to ask for a limited range of finishes from the whole silo industry in order that some discrimination can be exercised in each case, and so that the structure appears in a colour broadly suitable to its context in the landscape.

The CoID Panel hopes it will soon be able to suggest this limited range related to British Standard Colour Range BS 2660. In the meantime, farmers purchasing silos are advised to study the reference to colour in the publication *Farm Buildings and the Countryside* (page 14). The same argument concerning the colour of silos can be extended with some modification to other farm buildings and I am sure that if agricultural organizations can demonstrate some concern and knowledge of the problem this will vastly improve the climate of discussion between farmers and planners, and also assist manufacturers in their difficult task of relating colour finishes to amenity as well as to functional requirements. Farmers can also do more in this direction by organizing themselves to ensure that the selectors of Civic Trust Awards are presented with a wide choice of submissions in the category of farm buildings, including silos, so that the statement made in the last Civic Trust Award report that no farm buldings submitted were worthy of awards can be challenged. Maybe this is a job that might be done by a small committee set up by the Farm Buildings Association for that purpose.

I take heart from the commendable initiation of the Country Landowners' Association in running an Award Scheme this year for 'economic farm buildings' in the landscape and it is significant that the judges included in their awards a group of silos on an Essex farm.

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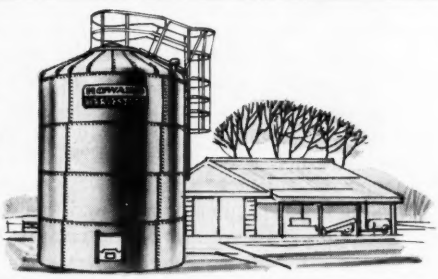
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J. C. Wilcox, Farm Director of
the *Trawscoed Experimental Husbandry Farm*,
discusses the pros and cons of

Summer Milk

AT present livestock and livestock products account for about 70 per cent of total farm sales. Their value in 1967/68 amounted to £1,327 million. Of this, £438 million was for milk and milk products. Imports of livestock products in 1967 cost £787 million of which milk products accounted for £203 million. The expansion of beef production depends to some extent upon an increase in the dairy herd and this increase should meet the growing need for liquid milk as Britain's population expands. The time of year at which this extra milk should be produced is influenced by a number of factors. Of these, price is probably the greatest incentive; and between the years 1957/58 and 1966/67, the price ratio of May/June to December/January milk has narrowed by 8 per cent, reducing the relative return for winter milk production. In the more westerly parts of the country where purchased concentrates are more expensive than in the arable areas, the incentive to produce winter milk is even less. Should milk prices fall or even remain constant in the face of rising costs, winter milk production based on expensive purchased concentrates appears unattractive. In the western part of the country there is already a swing towards summer milk and this would undoubtedly be greatly accelerated should a level milk price structure throughout the year, such as that used in the common market countries, come into force.

Figures collected by the Milk Marketing Board suggest that spring-calving cows have higher yields than autumn calvers. Milk sales for spring calving cows producing about 1,000 gallons are, however about £7 lower than the £162-164 sales per cow from autumn-calved cows.

Summer milk production using 1 lb of concentrates per gallon shows an advantage in margin over concentrates, of over £10 compared with winter milk production using 4 lb per gallon produced. The former entails the use of 9 cwt of concentrates per lactation, a figure which it should be possible to reduce considerably with good grazing management.

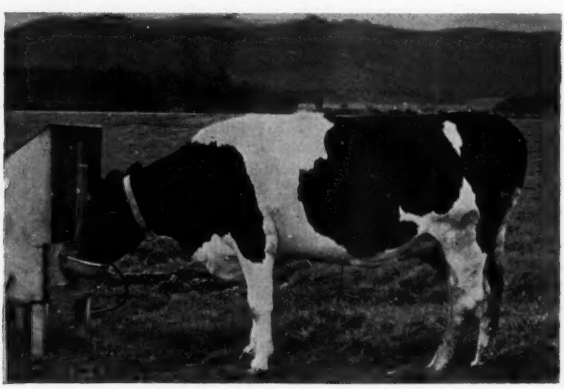
Efficient utilization of grassland to produce milk is dependant upon some form of controlled grazing, and the paddock grazing system is generally regarded as the best compromise between the requirements of the pasture and the utilization of labour. At Bridget's and Trawscoed Experimental Husbandry Farms work is in progress to investigate the intensification of summer milk production with spring-calving herds. At Bridget's in 1968 a

trial compared the effect on milk yield, milk quality and live weight of dairy cows stocked at 2¼ and 3 cows per acre. Each animal received 2 lb of mineralized barley a day but one group of the high stocking rate animals had 4 lb of rolled barley a day, and in addition straw was available. The pasture received 400 units of nitrogen per acre. The high stocking rate cows which received no supplementary feeding produced 1,614 gallons of milk per acre of summer grazing,

At Trawscoed the experiment was designed to compare differences between three systems of grazing management. In the first system cows were paddock grazed on the same area throughout the summer without supplementary feeding. The second system was identical to the first but 4 lb per head of rolled barley was fed daily. The third system was one in which the cows paddock grazed one area until mid-July when they were changed over to paddock grazing on aftermath. Summer stocking rate in 1968 was 2·5 cows per acre, and 378 units of nitrogen were applied per acre. Feeding barley to the cows has had little effect on milk production but has resulted in more of the grass being rejected and the cows have increased more in bodyweight. Changing over to aftermath has had no marked effect in boosting yield. In 1968 paddock grazing produced 1,554 gallons of milk per acre. Supplementary feeding with 4 lb of barley per head per day at grass increased the milk production per acre grazed by 34 gallons, worth £6 but the cost of the barley used to achieve this was £12. After the trial had ended, the cows were housed. The milk yield of the group that had received barley at grass was not significantly different from that of the other groups. Increasing the summer stocking rate by 25 per cent from two cows per acre in 1967, to two and a half cows per acre in 1968, resulted in an increase in milk production per acre of over 400 gallons.

One of the problems not yet resolved is the optimum time of calving in the spring. The records of the Milk Marketing Board suggest that February calving may be most profitable but as yet there is insufficient experimental evidence to support this, as against later calving in April. This problem, together with an investigation into the levels of feeding before turn out in spring are the subjects of an experiment recently started at Trawscoed Experimental Husbandry Farm.

Herds already producing summer milk from grass have pinpointed one of the problems of management as being the difficulty of getting cows in calf



Portable drinking bowl and mineral trough used in grazing experiments

quickly enough to maintain the spring calving pattern. It is hoped that in the course of the present investigations information obtained may indicate the reason for this problem and suggest a possible solution.

The problems associated with intensive grazing are now becoming evident. In wet weather such as we have had this spring, poaching and soiling of grass in the paddocks has been a problem. Although this has not been too evident with small herds of cows stocked at a very high rate, as cow numbers have got larger the problem has occurred at much lower stocking rates. Associated with the poaching is the formation of a pan a few inches below the soil surface on some soil types. Where this is marked, root growth may be restricted and the grass can be more easily pulled out by intensive grazing.

Among the less obvious possible advantages of summer milk production are the effects on winter feeding and housing. Because the bulk of the milk is obtained off grass and during the winter milk yields are low before drying off, fodder for the winter need not be of such high quality. This in turn means that conservation need not be so early in the season and should not compete with grazing needed for milk production.

In recent years the cost of housing dairy cows has become increasingly expensive. There is at present insufficient information about the effect on milk production of housing spring-calving cows. Summer milk production can probably be sustained with a cheap form of shelter during the winter and in many climates it is debatable whether or not complete shelter is required.

The trend towards summer milk production in the more westerly parts of the country appears to be gathering momentum and seems logical and, while there are many farmers already producing summer milk very successfully, there are many problems yet to be resolved.

Now's the time to attack WARBLES

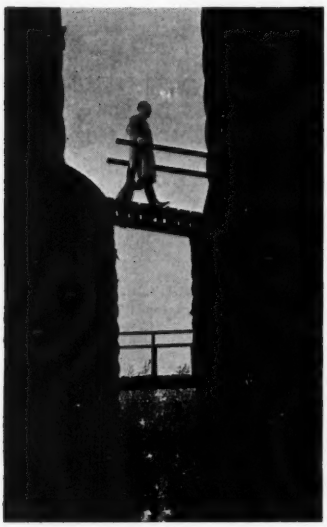
The warble fly continues to be a source of loss to the farming industry, and farmers are urged to make an all-out attack on the fly this autumn. Cattle free of warbles can produce more meat, more milk, and better hides.

The fly lays its eggs on the hair of the hind legs of cattle out at grass, chiefly during July and August, and when the maggots hatch they at once bore their way through the skin and begin to make their way through the animal's body. It is now possible, by treatment with systemic insecticides in the autumn or early winter, to destroy the pest at this stage of its development, before the grub matures and damages the hide.

Treatment against warbles **now** is the best insurance that they will not reappear next summer and live to start the life-cycle all over again.

The subject is dealt with in greater detail in Advisory Leaflet No. 533; single copies can be obtained, free, from the Ministry of Agriculture, Fisheries and Food, Tolcarne Drive, Pinner, Middlesex HA5 2DT or from the local offices of the Ministry. For further advice, farmers should consult their veterinary surgeon.

Fruit wines—a growing industry that can help British growers



Unusual view of some of the giant vats at Horam Manor. Each vat holds 40,000 gallon of apple wine

This article has been contributed by **J. L. Ward,** joint managing director of the **Merrydown Wine Co., Horam, Sussex.** The Company's wines, made by normal fermentation, are produced from nine different fruits grown in England. These wines have an alcohol content of about 22 deg. proof spirit

Fruit Wines

'My grandmother's gooseberry wine tasted exactly like champagne. You just couldn't tell the difference!'

We are all familiar with this kind of boast and with similar flights of extravagant fancy: 'A small glass of her parsnip wine and I lost the use of my legs!'

Romantic legends of this nature have done much to confuse the image of fruit wines in our native land, where they fail to achieve the recognition enjoyed in more enlightened countries.

Of course gooseberry wine doesn't taste like champagne; if it did everyone would be wanting to drink it. Nor by any stretch of imagination is parsnip wine more powerful than whisky. For a proper appreciation of fruit wines, let's wipe all this tomfoolery off the slate and start from scratch.

There are two kinds of fruit wines available in Britain today. Those which enjoy the largest sale are not fruit wines as such; they are made instead from imported grapes or grape juice with an appropriate flavouring added. All of them are abundantly sweet and contain as much alcohol as the lower rate of

Excise duty will permit. Their flavours are modelled on some of the more obvious liqueurs, exclusively those which are permeated with the aroma of some popular fruit, such as orange, cherry, apricot etc. They are competently made and effectively satisfy a huge public demand; but to call them fruit wines is, in my opinion, an inappropriate description.

A couple of decades, or thereabouts, has seen the first commercial production of genuine fruit wines in this country. These wines are not made from grapes or grape juice, except where that fruit happens to contribute an auxiliary flavour, as in the case of mead; instead they are produced almost exclusively from the freshly expressed juice of many familiar fruits grown in this country.

Centuries of ignorance have confined the use of such fruit to strictly culinary purposes. Apples and pears excepted, no domestic English fruit has, until recently, enjoyed the glamour of a commercial wine cellar. But now farmers are providing white, red and black currants, gooseberries, blackberries, strawberries, raspberries, as well as apples and pears, for the production of table wines, both sparkling and still, which can offer very exciting alternatives to some more popular foreign imports.

Such fruits are mistakenly supposed to lack those essential ingredients usually found in the grape, which provide the organic components considered necessary for the production of an attractive vinous drink. Such hypotheses are misleading; the various ingredients are all there, but somewhere the recipe has gone wrong. Nature has tempered her bounty and failed to provide that perfect balance which we have come to regard as a matter of course in the vinification of grape juice.

These largely domestic fruits generally need adjustment. More often than not they contain too much acid and always too little sugar. Nevertheless, vinophiles are inclined to forget that unsuitable weather conditions produce the same kind of symptoms in the northerly vineyards of the Continent, so that European grape juice is often concerned with the same problem.

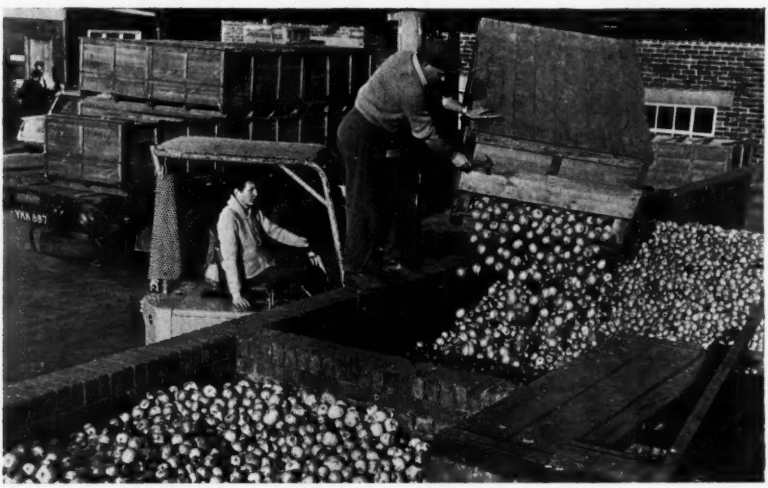
The solution is a simple one; the acid must be reduced and the sugar increased. The methods used with all juices, whether from orchard or vineyard, are identical. It is a mere pretence, therefore, to suggest that any significant difference exists between the production of English fruit wines of this category and those which are reverently observed to emerge from European vineyards.

This iconoclastic approach may be considered irreverent by the pundits, but it is surely fair to insist that all juices contain similar components which are individually distributed in different proportions.

Gooseberry is not like champagne. Neither is claret. Why should fruit wines be judged by such a criterion? Whisky is not a bit like brandy and cannot claim to be made from grapes. Is it, therefore, inferior? Evaluation of real fruit wines cannot depend on such ephemeral qualities. White currants, which can produce a fermented beverage so indistinguishable from real wine that even experts are baffled, should be regarded not as a substitute, but as an alternative fruit, capable of producing a wine that many vineyards would be only too eager to match if the varieties planted, soil conditions and climate permitted.

Instead of pretending that white currant wine is just like Liebfraumilch, it might be more appropriate to suggest that the versatile grape had so far failed to produce a wine with qualities to match those which could be so attractively provided by a relatively unpopular garden fruit.

What kind of a future can these essentially English wines expect, unless they can offer an alternative to those adequate but indistinguished imports which are now enjoying such a vogue with the British public? To argue that fruit wines can never match the peerless, and, therefore, 'priceless' products of the vineyard, is clearly beside the point; no one in his senses could pretend that something made from garden fruits could possibly display the subtle qualities of a first growth claret. But how many people drink claret with a classification of any kind whatever? It is surely no revelation to suggest that for every bottle of excellent wine consumed in this country there are very many more which are merely indifferent.



Apples by the ton. Sussex Bramleys cascading into bins for crushing at the Merrydown Wine Co. All the apples used by the winery are Sussex and Kent dessert and culinary varieties. Merrydown handle over 2,000 tons of them annually. Crushing normally begins in mid-September and goes through to November

With this kind of challenge, no real problems of quality exist. Its naturally wide range of flavours provides the fruit wine industry with a telling advantage, in spite of the ingenuity used in the production of port, sherry, champagne and vermouth, all of which successfully extend the versatility of the grape. Such sophistication is clearly unnecessary when dealing with fruits so manifestly diverse as apples and blackberries, or white currants and raspberries.

Nevertheless, it would be quite wrong to assume that pleasant wines can be automatically produced from these and other familiar fruits of the English countryside. The finest grape juice from the Gironde can be ruined by inexpert treatment. Years of amateur winemaking, unaided by skilled advice, has done little for this Cinderella of the drinks industry and almost nothing to improve its image. There is absolutely no reason, on the other hand, why the loving care and research, lavishly expended on the fermentation of grape juice, should not be matched by a similar effort to further the development of a British fruit wine industry.

If the problems of quality are insignificant, those of prejudice are certainly formidable. Two thousand years of triumphant progress have furnished the vine with indelible glamour. A powerful influence of this nature is apt to distort the judgement of a consumer, especially in England, where eating and drinking habits are seldom adventurous. The commercial production of fruit wine is a thriving industry in California, Germany, Denmark, Poland, Russia and Rumania. So why not in Britain, where the prospects of viticulture are limited? Everyone knows that a reasonable price differential can make a good section of the public tend to forget the snob appeal of Beaujolais.

So far, only small quantities of fresh fruit are being used in this country for wine making. The industry is very much in its infancy, but has a promising potential. The Merrydown Wine Company, pioneers of fruit wine production in the United Kingdom, currently use the following tonnage of fruit annually:

Apples (for apple wine)	1,200
(for cider vinegar)	500
(for mead)	100
Red currants	18
Black currants	1
White currants	1½
Gooseberry	13
Strawberry	9
Raspberry	3
Blackberry	6

Most of these are obtained from farms in South-east England, although a few apples have recently been imported from Northern Ireland.

Future prospects would be excellent if the present Excise duties could be modified. By supporting these truly English wines, the consumer is paying tax for a product that owes nothing to foreign effort or endeavour. In fact, the present tax was introduced for a British wine of quite a different character, with an alcohol content well above the normal limits considered desirable for a table wine.

This would help to explain why the Merrydown range of fruit wines has been enjoying such popularity abroad. While the apple continues to make steady progress, the remaining fruit wines have shown a 55 per cent sales increase during the last three years. These fantastic results have had significant assistance from overseas and could be extended, if equitable marketing conditions existed in Britain.

Such an industry, if properly developed, could render invaluable assistance to the English fruit grower by creating a new outlet not only for apples and pears, but also for an impressive variety of commercial fruits haunted by an uncertain future: to say nothing of the foreign currency we spend on a luxury that could be provided at home.

The 1969 Royal Smithfield Show and Agricultural Machinery Exhibition will be held at Earls Court, London, from 8th to 12th December (inclusive).



B. Jarvis

Food Research at the National College of Food Technology



A. J. Reynolds

THE National College of Food Technology was established by the Ministry of Education in 1951 as a direct grant institution, following representations made on behalf of the food industry. The College was governed by a board representative of the food industry, government departments (including the Ministry of Agriculture, Fisheries and Food) and professional organizations. Originally situated near the City of London, the College moved to its present site at Weybridge in 1959.

A two-year course for a College Diploma in Food Technology began in 1952 and later a four-year 'sandwich' type course was introduced. Initially this course led to the Associateship of the College but in 1963 the course was recognized for the award of the Dip. Tech. In 1966 the College was absorbed into the University of Reading, becoming the Department of Food Technology and the four-year course now leads to an honours B.Sc. degree in food technology. In addition to undergraduate teaching, post-graduate (M.Sc.) taught courses are offered in food microbiology, quality control and food technology. These courses are primarily designed for honours graduates in pure sciences and engineering who require specialized training which will fit them for a particular type of post in the food industry. Facilities are also available for post-graduate research work leading to the degrees of M.Phil. or Ph.D.

What is food technology?

Athough farm-fresh foods are often to be preferred it is not possible for everyone to have fresh produce at all times, especially in these days of large urban conurbations. It is now possible to preserve many foods so that they may be eaten out of season, and to process foods to provide the housewife with a wide range of 'convenience' foods. The ramifications of food processing are too numerous to consider at this time but it is important to remember that the food industry is one of the major industries in the developed countries.

Food technology plays a central role in the preservation, packaging and marketing of foods and, since high quality raw materials are required, the food technologist will frequently work in close liaison with agricultural specialists in the selection and breeding of varieties of vegetables, cereals, livestock, etc., and in the decisions relating to choice of the optimal periods for harvesting of certain foods. Many farmers arrange guaranteed markets for their produce through direct contracts with food companies.

Food technology as a discipline is essentially the application of science to the industrial scale processing, preservation and distribution of foods. Ideally, the food technologist therefore requires an understanding of the principles of biology, microbiology, chemistry, biochemistry, nutrition, physics and statistics in relation to both the preservation and the processing of foods. Because of the large physical scale of food processing the technologist also requires a working knowledge of engineering design, of the applications of engineering to food handling and processing and of the principles of industrial management. The aim of the College is to provide graduate technologists who are qualified for positions in production management, research and development, quality control, etc., within the food industry.

Research is conducted at the College since the viability of an educational establishment is dependent, amongst other things, on a vigorous research school. Such research will not normally benefit any one particular commercial firm but will benefit the industry at large both in this country and abroad. The research undertaken is financed by funds from the University Grants Committee, from the Science Research Council, Government Departments and the National Research and Development Corporation, in addition to grants from commercial firms and from related trusts. For the purpose of this article the research is subdivided into food science and food processing and engineering, although in practice some of the projects may extend from basic sciences to biological engineering.

Research in food science

Much of the work in this field is concerned with food additives and with minor constituents of foods. Other topics include the assessment of food quality and the production of new sources of protein foods.

Food sugars. It addition to the normal granular forms of sucrose and glucose the food industry often uses commercially prepared concentrated solutions (or syrups) of sugars. Commercial liquid glucose contains minute amounts of other sugars. Work at the College is concerned with the detection, isolation and identification of these minor constituents particularly from the viewpoint of their effect on the physical, chemical and physiological properties of the syrup. The physiological properties of sugars affect the extent and rate of their absorption following digestion and their taste (i.e., whether they are sweet or bitter). The relationship between the chemical structure and the degree of sweetness has been found to be of considerable importance. The physiological properties also determine whether or not they are capable of inducing metabolic diseases (e.g., milk sugar, lactose, may induce galactosaemia in certain infants and in many Oriental people). Other work includes studies of the way in which enzymes break down starch and other complex sugars.

Food colours. Natural or artificial colouring matters may be added to commercially prepared foods to offset the effects of the preservation process

on their colour and to improve the visual appeal of foods. However, when these foods are ingested the colouring matters will come into contact with intestinal micro-organisms which may chemically change the colours. Research is being undertaken into the effect of these intestinal micro-organisms on a group of azo food colours. Several aspects are being investigated (1) to determine which organisms can break down the dyes, (2) to isolate and identify the break-down products, (3) to determine the nature of the enzymic breakdown of the dyes and (4) to determine the factors which affect the absorption of the dyes and of their break-down products from the intestine. Information of this nature is required to assess the toxicological results obtained with animals other than man and from which it is required to predict possible toxic effects in man. Certain aspects of this work are being carried out in collaboration with the British Industrial Biological Research Association.

Antibiotics and heat preservation of foods. A method of food preservation which has received much attention over the past twenty years is the use of antibiotics to kill, or retard the growth of, micro-organisms which may cause spoilage of raw and processed foods. Our major interest is in the antibiotic nisin, which occurs naturally in cheese and which is permitted in Britain for use in processed cheese and in canned foods. Investigations have been concerned with problems of bacterial resistance to nisin, the chemistry of nisin and, more recently, with the biosynthesis of nisin. The College is also concerned with methods for the identification of nisin in foods and in this it collaborates with the Dairying Sub-committee on Nisin of the British Standards Institute.

Canned foods are normally heated in steam at very high temperatures to destroy bacteria which might grow and cause spoilage of the food or which in some cases, might be potentially harmful to man. Unfortunately, the severity of the heat process may reduce the nutritional value and cause changes in both flavour and appearance of the food. One of the major uses of nisin is that of inhibiting the development of bacterial spores which may survive the commercial sterilization processes given to canned foods. Such use may enable manufacturers to reduce slightly the severity of their processing conditions, thereby improving the appearance, taste and nutritional value of the foods without introducing any potential health hazards or spoilage problems. However, yeasts and moulds are not affected by nisin and may survive the relatively mild heat process given to certain acid foods (e.g., pickles) and cause post-process spoilage. The heat resistance of yeasts and the effect on this of various components of pasteurized sweet pickle is being investigated. The components which appear to influence the heat resistance most are the salt and sugar content and the degree and type of acidity.

Food analysis. The bacterial, chemical and bio-chemical changes which take place in stored meats and fish have been studied for many years at the College. Changes in the physical nature and the chemical composition of meats have been correlated statistically with organoleptic changes (i.e., changes in odour, appearance, flavour, etc.) to produce commercial standards for the assessment of the quality of meats. Similar investigations are being undertaken with fish.

New instrumental methods of food analysis are being investigated since these are often more accurate, simpler and less time consuming than are conventional chemical methods. Such instrumental techniques include the

use of attenuated total reflectance (ATR) infra-red spectroscopy, atomic absorption spectroscopy and the use of ion-specific electrodes for quantitative determination of trace elements in foods.

New sources of protein foods. The continually widening gulf between the demand for and the supply of protein foods throughout the world has led to research into possible new sources of protein. An investigation of the use of agricultural by-products (e.g., straw, rice husk, etc.) for the growth of edible higher fungi is being carried out. The waste materials are treated chemically to produce sugars which can be utilized by the fungi. After growth in submerged fermenters the fungal mycelium, which resembles mushroom in flavour, is harvested and dried to produce a powder containing up to 50 per cent protein. This material may be used either as animal feed or as a dietary supplement for human consumption. Nutritional and toxicological trials of these protein preparations are currently being undertaken. The long-term economic feasibility of processes such as this cannot readily be assessed until large-scale production is investigated, but the process may also yield by-products of industrial importance, such as enzymes, which will break down cellulose and other polysaccharides which cannot be digested by man. The sale of by-products of this nature may help to offset the cost of producing the protein, thereby improving the economic feasibility of the process.

Food processing and engineering

A number of research projects in food processing and engineering are under way at the College. One group is mainly concerned with the evaluation of various basic physical properties of foods of significance in plant design, quality assessment and control.

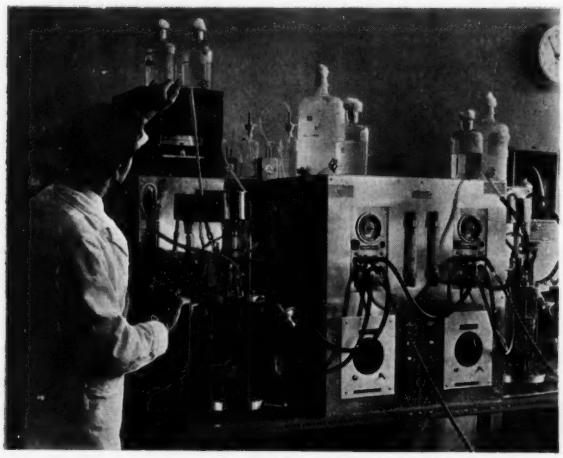
There is generally a lack of reliable data on the physical properties of foods. This has been clearly shown in recent surveys of the food industry and of the literature relating to physical properties of foods conducted from the College. These surveys revealed large gaps in our knowledge which need to be filled and indicated the desirabliity of a more extensive programme to cover the

Objective method for the assessment of food texture using the 'General Foods' texturometer



vast number of foods now processed. In this programme the College is actively participating as a centre for the establishment of international collaboration on the physical properties of foods.

Rheology of foods. Rheology is the science of the deformation and flow of matter. The rheology of foods is a topic which, in the past, has not received all the attention which is perhaps warranted. The flow of liquid and quasi-liquid materials is of particular interest at the College. Materials presently being investigated, such as tomato juice, tomato sauce and salad cream, are



Submerged cultivation of edible fungi in fermenters for the preparation of dietary protein supplements

considered to be amongst the most complex which are likely to be encountered and physical constants which characterize these materials are being determined from data obtained from studies of their viscosities.

Heating and freezing of foods. Basic problems in the heat penetration of foods during sterlization and pasteurization, and in the engineering aspects of freezing—particularly the calculation of freezing times of foods—are major foci of research interest. A recently completed project was a feasibility study of a new process of continuous fluidized bed heat-sterilization of canned foods. In this process, cans are heated by passing them through a bed of sand which has been 'fluidized' by blowing hot air through it.

Food structure and texture. Foods undergo changes in structure, and therefore in texture, as a result of processing. An investigation of the factors which affect such changes in freeze-dried foods is being undertaken at the College. The work involves a detailed study of the effects of varying processing techniques and conditions at different stages of the freeze-drying process on the structure, texture and related physical properties of the foods. Comparisons are also being made of traditional methods and of new objective techniques for assessment of these characteristics.

Powder mechanics. The bulk handling of powdered and granulated solids plays an important part in many food processes. Milling, mixing and blending, drying, conveying and the storage of particulate solids are all common operations involving, to some extent the, as yet, little understood principles of powder mechanics. The College is increasingly interested in this important

field. Factors which affect the flow of materials through hoppers and pipelines, and the inter-relationships between the physical properties of the particulate solids (e.g., size, size distribution, density, etc.) and the 'flowability' of the powders, are being investigated.

Computer technology. An analogue computer is being used for simulation of physical systems and plant operations relevant to the food industry. The flow of liquid through a pipe has been successfully simulated and current work is concerned with the simulation of an evaporation process with a view to determining optimal operating conditions and control strategies. The analogue computer is also being used for the evaluation of heat sterilization processes.

Computer techniques have also been of value in the automation of process operations. In the food industry large amounts of liquid and/or solid food ingredients are often measured and blended together. Dispensing of liquids and solids for the mixing of bulk foods and for the filling of cans are examples of processes in the food industry which readily lend themselves to automation and which may one day be controlled by computer.

Conclusion

We have outlined a little of the work of the National College of Food Technology, but in an article of this nature it is obviously impossible to go into detail on the individual research topics or into the question of employment prospects for graduates in Food Technology. The authors welcome specific requests for information which will be passed on, where appropriate, to their colleagues to whom they are indebted for permission to publish summaries of their research work. (The address of the College is, National College of Food Technology, University of Reading, St. George's Avenue, Weybridge, Surrey. Tel. Weybridge 43991.)

B. Jarvis, B.Sc., Ph.D., D.C.C., M.I.Biol., M.R.S.H., is a graduate of Reading University. Previous to his present post in 1964 as lecturer in microbiology at the National College of Food Technology he worked in the dairy industry, in the Health Service and at the Tropical Products Institute, London. His co-author, **A. J. Reynolds, B.Sc., M.I.Biol.,** graduated at University College Cardiff in 1963 and joined the College in 1964 after a teachers training course. He also is a lecturer in microbiology.

WORRYING OF LIVESTOCK BY DOGS

Every year there is extensive worrying, chasing and savaging of livestock by dogs; sheep and poultry are killed in their hundreds. Dog owners who live in or near the country, and those people taking their dogs into the countryside during the holidays, are reminded to keep their dogs under control at all times and on a lead when farm animals are about.

There are now severe penalties for allowing a dog to worry livestock. The owner, or the person in charge, of a dog found worrying livestock is liable to prosecution and an action for damages and a Court may order the dog to be destroyed. In certain circumstances a dog may lawfully be shot by the farmer.

If the people in charge of dogs take the precaution of keeping them under control, the suffering and injury caused to sheep and other livestock by unnecessary worrying can be reduced.

28. Merioneth

Ivor W. Jones

ALTHOUGH Merioneth is the most mountainous county in Wales, agriculture is its main industry and this is closely followed by tourism. Its unsurpassed rugged beauty and bathing resorts attract thousands of visitors each year. A long attractive coastline from Aberdovey in the south to Penrhyndeudraeth in the north includes a number of unspoilt sandy beaches. Innumerable valleys and glens have been cut out from the hill-sides by the rivers which wind their ways through beautiful estuaries, to Cardigan Bay. The only exception is the river Dee which travels east to Cheshire.

The county itself extends in the form of a triangle from the coast of Cardigan Bay to a point about forty-five miles inland not far from Llangollen, and fairly near to the English border. Nature has also created a number of natural lakes—Llyn Tegid at Bala is notable in being the largest natural lake in Wales. The lakes at Trawsfynydd and Tryweryn are man made. The former's water power is being used for generating electricity and to cool vital parts of the nuclear station built on its bank, and the latter to supplement the Liverpool water supply.

Pastoral systems

The nature of the terrain has produced a thin soil on the slopes or peaty layers of soil on the flats in the uplands. These conditions and high rainfall with long winters dictate a pastoral system of farming. Hill farming using indigenous stock of Welsh mountain sheep and Welsh Black Cattle is the main enterprise. Traditional methods of husbandry and stock management die hard because of the difficulty of adapting new technology and mechanization in upland areas. The basic stock has been developed over centuries to suit the environment. Breed improvements proceed very successfully under the auspices of Cymdeithas Defaid Mynydd Meirion (Merioneth Mountain Flock Society) and the Welsh Black Cattle Society.

The sheep flocks belong to and are part and parcel of the hills. The farmers may change but the flocks are always taken over at valuation by the new tenant or owner, at a price above the market value which allows for the acclimatization value of the animals on their respective grazings or cynefin. A perfect balance between stock numbers and available grass is the key to good mountain sheep husbandry.

Tradition would have it that hand-feeding of hill ewes would ruin their capacity to forage for their own food, but science and practice have proved against tradition and most flockmasters now hand-feed their flocks as necessary. The degree of supplementation has to be limited to correspond to the low value of the output from hill sheep flocks.

Cattle are always supplementary to sheep farming in Merioneth, and dairy cattle are in minority to beef stock. The Welsh Black cow usually suckles her own calf on the rough pastures and the calves are sold in late autumn to feeders from lowland counties. This is a complete change from the traditional structure of years gone by when store stock was retained for three years before being sold to be fattened off as beef on the strong Midland pastures. Female stock of the Welsh Black breed is in keen demand from buyers from all parts of Britain owing to their reputation as hardy, thrifty animals with a good flow of milk over an extended lactation.

Modern trends

Although Merionethshire farmers are, in the main, using traditional systems in hill areas there are many examples of a complete break with tradition on lowland farms. There is the grower of cereals on the largest scale in North Wales on the one hand and the intensive dairy farmer keeping a dairy cow to the acre on the other. Both use the most modern techniques and equipment to assist the process. The producers of young beef combine the use of intensively-produced grass with home-grown cereals very successfully. Sheep are wintered indoors to save the pastures in winter, thus ensuring their better utilization in the summer.

Three farmer-organized groups produce weaner pigs for sale collectively. Co-operation has always flourished in the County where a large number of co-operative requisite societies have thrived. A producer owned creamery was established at the outbreak of war. More recently a suckler calf producer association was formed which organizes sales of store cattle over the weighbridge as well as looking after other matters of interest to producers. The poultry industry has dwindled to negligible proportions but pony breeding is on the increase and provides a valuable source of income.

Merioneth has a sad history in the matter of rural depopulation which still continues. Many of the smaller farming units are being absorbed to form more viable enterprises. In many instances the farmhouses are purchased to be occupied as summer cottages.

Rural economy is being reinforced by making the basic industry of hill farming more attractive to the farmer and his wife. Communications and social amenities have improved tremendously and isolation practically eliminated. Forestry has developed alongside agriculture in Merioneth since the late twenties and by now 45,000 acres of forest trees are grown.

Technical development is also taking place on hill farms. Land improvement and the provision of stock handling facilities are successfully encouraged by the Hill Land Improvement Scheme with the aim of making the hill farmer less dependent upon his lowland customer. Better feeding systems are being adapted quickly within the confines of the economy.

Hill farmers have to be born in their environment and neighbourliness is a must in these surroundings as many of the stock handling chores have to be undertaken communally. Climatic and soil conditions do not make life easy in the county but they help to build up hardiness and strength of character and encourage a spirit of co-operation and mutual help, together with a love of all that is best in life; all these are prominent traits in the sons and daughters of Meirion.

Easier Calf Feeding on the Small Farm

R. R. Menneer, *Agricultural Land Service, Cardiff*

BUCKET-FEEDING 10–30 unweaned calves usually involves many trips with buckets of milk backwards and forwards from a central mixing point (often the dairy) to the various calf pens. A previous article* described the straw-baled individual penning system known as calf nooks and this follow-up article shows how, subsequently, with the help of method study, the walking distance was halved. The investigation formed a training exercise for work study students, some of whom had little previous experience with calves.

The use of calf nooks is rotated around the available buildings to avoid disease build-up but each individual nook houses one baby calf which requires reconstituted milk, meal, water, hay and straw bedding. The milk is given twice daily, when the other requirements are also attended to and replenished or freshened up as necessary.

In the original method, the farmer carried two full buckets of milk to the pen and then poured out approximately equal rations (estimated by weight of buckets) into other buckets. These rations were adjusted to age and requirements of the calves. The buckets were taken into the pen and after the meal buckets had been removed, placed in the bucket hoops in the nook front so



The original method

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that the calf could drink. For sixteen calves, this procedure necessitated eight journeys to or from the dairy and the total distance taken twice daily was about half a mile.



The new method

The new method involves the mounting of a mixer-unit (costing £23) to form an insulated wheeled barrow for the carriage of the milk from the mixing place to pen. This mixer-unit, with a surrounding layer of insulation, fits conveniently into a sawn-off 45 gallon drum which, mounted on two pneumatic wheel-barrow wheels, makes an easily pushed conveyor. Up to fifty rations can be mixed at one time and wheeled from pen to pen; the insulated barrow keeps the milk warm until all calves are fed. By using a quart measure, found in the old cowshed, the farmer is able more accurately to measure the rations without re-adjustments and, with a third hoop welded on to the calf nook fronts, he is able to give the milk to the calves without having first to remove the meal buckets.

Instead of fetching hay, straw and meal from a nearby store as required at each feed, these items are brought once a week to the pen by tractor and trailer and stored temporarily on the half 'roof' over the nooks.

The new distance walked is about 350 yards twice daily (compared with about 860 yards) and the carrying of full buckets has stopped.

The time saved on a feeding of only sixteen calves is about half-an-hour a day. The annual saving in distance is about 200 miles with a total weight carried of 13 tons! For more calves, the proportional gain would be higher, up to the number of calves which could be fed with one trip of the barrow.

To those interested in this method of feeding, further information is available from the A.L.S. Work Study Unit, Great Westminster House, Horseferry Road, London, S.W.1.

in brief

- **Pea Growing Research Organisation**
- **Rungis—a new beginning**
- **Cracked eggs**

Pea Growing Research Organisation

THE rise of peas to the status of a major vegetable in this country is one of the outstanding stories of the second half of the twentieth century, reflecting an advance in husbandry methods and food processing technology which has been little short of meteoric. In a matter of fifteen years or so canned garden and quick frozen peas have become a commonplace in the average diet all the year round, and the farm area (mainly in eastern England) now devoted to this crop, grown almost entirely on contract for processors, totals 104,500 acres. Of these, nearly 88,000 acres are estimated to be under vining peas, giving an output of 173,000 tons a year.

It is twenty-five years since the Home Grown Threshed Peas Joint Committee was set up, later to become the Pea Growing Research Organisation, and over that period the organisation has developed from one concentrating on the provision of research, information and advisory services in relation to the production of dried peas to one concerned also (since 1936) with vining peas and (since 1963) broad, dwarf and runner beans. Working in close co-operation with research institutes, the N.A.A.S. and commercial firms, it has established itself firmly in this important sector of food production, covering varietal selection and a seed approval scheme in collaboration with the N.I.A.B., field trials over a range of different soils, evaluations of new herbicide treatments in the interests of yield, quality and throughput, and the up-hill struggle against the diseases and pests to which these specialist crops are particularly heir.

At its new station at Thornhaugh, near Peterborough, the Organisation now intends to look closely into widening its research to include other crops, such as Brussels sprouts and carrots—a matter which growers and processors have been pressing for some time—and even closer links with the N.A.A.S. will be forged in order to pool resources and information. The joint programme on pea midge planned between P.G.R.O. and the N.A.A.S. and the introduction of an Early Warning Scheme are cases in point.

The scale of the work of the Pea Growing Research Organisation is out of all proportion to the smallness of its staff under the lead of its Director, Mr. A. G. Gane, and certainly merits the fullest possible voluntary support from *every* grower and processor. Incidentally, the new edition of the Ministry's Bulletin No. 81 (price 7*s.* by post 7*s.* 6*d.* from H.M.S.O.) is a truly valuable guide to the husbandry of the pea crop, whether for processing or other markets.

Rungis—a new beginning

HISTORIC customs, picturesque buildings, narrow streets and other residue of earlier times may be a bait and a boost for tourism, but they do nothing to promote the efficiency of meeting the needs of twentieth century life, and may indeed often obstruct it. Such was Les Halles Centralles, the famous old wholesale food market

that has stood in the heart of Paris for the past hundred years and in much the same neighbourhood that Louis VI chose for it in 1135. For years *le ventre de Paris*, as Emile Zola dubbed it, has been bursting at the seams under the pressure of its own ever-mounting activity, a nucleus of indescribable congestion that built up traffic jams deep into the surrounding area. From its original 10 acres designed in 1860 to serve a population of 1½ million, it had by 1969 spread to 75 acres in an attempt to meet the needs of some 8 million consumers.

All this now belongs to the past, since in March a new market for the handling of fruit, vegetables, flowers, dairy produce and fish was opened at Rungis, seven miles south, as a State undertaking in co-operation with the city of Paris. It is ideally located in view of the fact that 70 per cent of the fruit and vegetables flowing into the capital comes from the south. The market proper covers 500 acres out of a total area of nearly 900 acres, much the biggest wholesale market in the E.E.C. Railway facilities (of which Les Halles had none) will handle about one million metric tons a year, there is parking space for 10,000 vehicles, and when fully operational the market will be employing, directly or indirectly, an estimated 40,000 people. It is also quite close to Orly airport and therefore conveniently situated for air freights of perishable produce. Situated outside Paris, the market also has the advantage of being able to service the greatly swollen suburban population—a 250 per cent increase during the past fifty years, compared with only 5 per cent in the city.

Rungis is one of a series of twenty-five new produce markets either already built or planned for construction throughout France, together making up the Markets of National Interest. When completed they will be interconnected by telex, linked to the national road and rail systems, equipped with ample storage, ripening and pre-packaging facilities, plus auction rooms and every type of sales system.

Visitors to Paris will recall nostalgically the early morning visits to Les Halles, the traditional onion soup, warm bread, salt pork and a glass or two of *vin blanc*, but they may take comfort from the thought that as much as a quarter of the population of France is being served more efficiently because of it.

Cracked eggs

IMPROVED cage design could lead to a marked reduction in the loss of second quality eggs due to cracking, says Mr. H. A. Elson, N.A.A.S. Poultry Adviser, at the Ministry's Divisional Office, Durham, in a recent report. This kind of trouble can all too easily affect overall profitability. Mr. Elson directs attention to the design of cage floors and shows from a N.A.A.S. survey that where wire netting was used instead of welded wire, cracking (including hair cracks) was reduced by half. 'In multi-bird cages,' says Mr. Elson, 'about two-thirds of the eggs cracked actually break when they hit each other while waiting to be collected; thus if the eggs can be slowed up before they collide, a significant reduction in cracks will be achieved.'

Where candling shows hair cracks to be star-shaped, this can be taken as *prima facie* evidence of collision with other eggs in the collecting area. By bending up the fronts of the floors, so reducing the impact of one egg on another, the situation can often be much improved. If the majority of the cracks are straight, the wire is probably of too thick a gauge. The report also suggests that some cracks may be 'pin-holes' caused by the birds' claws slipping off the anti-egg eating baffle plate on to eggs which have been held up in the cage, causing the splintered shell to be forced into the shell membranes.

AGRIC

The 1969 Royal International Poultry Show
will be held at Olympia, London, W.14
from 10th to 12th December (inclusive).

Books

Advances in Pest Control Research. (Vol. 8). Edited by R. L. METCALF. John Wiley, 1969. £7

This book, eighth in a series started twelve years ago, contains three extensive, well-written reviews. Two are from the U.S.A. The first deals with the 'Behaviour and Fate of s-triazines in Soils'—s-triazines include such familiar herbicides as simazine and prometryne. The second discusses 'insect sex pheromones'. Pheromones are chemicals used for communication among insects and are 'secreted by an animal to induce a behavioural or physiological response in other individuals of the same species'.

The third review, 'The Bipyridylium Herbicides' is by A. Calderbank of Jealott's Hill Research Station, Bracknell, Berkshire. It is concerned mainly with diquat and paraquat and discusses their synthesis, chemistry and determination by analysis, their herbicidal properties, mode of action, toxicology, and fate in plants, soil and water. Each review provides abundant references to original work.

Research in pest control is now extensive and concerns workers in many disciplines, e.g., chemistry, physics, ecology, plant pathology, entomology and weed science. It is as a means of communicating to workers and teachers in these various fields and providing them with a background of information that the value of this series of books is to be found. The series is too specialized to be of great interest to farmers and general agricultural advisers; the same can generally be said for the reviews in the present volume.

The review of the bipyridylium herbicides does summarize the agronomic uses of these herbicides but these sections tend to be brief and rather uncritical. The review of pheromones provides some interesting reading, even to the layman, although as the final few pages of the review indicate, the development of practical means of using these substances for controlling insects will not be easy. The article on triazine herbicides is esoteric.

S.A.E.

Soil Biology and Biochemistry. Vol. 1. No. 1. April, 1969. Edited by E. W. RUSSELL AND J. S. WAID. Pergamon Press.

This is a new journal which is published quarterly and the annual subscription is £12 per annum to libraries, research institutes, etc.; £5 per annum to individuals for personal use. Single copies cost 70*s.*

The ten research papers, two research notes and one review in this journal are of high quality and undoubtably could have been published in already existing journals. *Soil Biology and Biochemistry* is expensive: it costs a library 7*d.* per page, compared to the 2*d.* per page of a long-established American soils journal, also published commercially. Sales are virtually guaranteed because any library covering the agricultural sciences must take out a subscription as soon as a reputable journal such as this appears.

What are the scientific justifications for this new journal? Quick publication is one, although as Vol. 1. No. 1. does not say when the manuscripts were received, publication time cannot be calculated. Another is the publication of review articles of the quality of the one in the first issue, as most of the existing soils journals only publish research papers. However, the main justification for the creation of *Soil Biology and Biochemistry* is that it should give soil biology a new coherence, by bringing together a scattered literature: its value to readers and authors will be judged by its success in doing this.

D.S.J.

Marketing Farm Products. (5th Edition). GEOFFREY S. SHEPHERD and GENE A. FUTRELL. Iowa State University Press, 1969. $9.50 (£3 17*s.* 7*d.* approx.)

This book consists of two main sections apart from the introduction and two chapters which detail the framework of the subject. In the first section, the authors classify marketing problems into three broad groups relating to the demand for farm products, prices of products and the way they reflect these demands to producers and, finally, the costs of getting produce from the producer to the consumer. In the second main section, the authors discuss marketing problems with reference to individual commodities produced in the U.S.A. The treatment of demand, prices and costs is for each in terms of time, place and form of marketing.

The authors give a wide ranging description of the situation in the U.S.A. and the book is of interest to British students of marketing, as it indicates the marketing trends which would be expected to occur in Britain. In particular, the effect of modern methods and speed of communication and also of changing technologies in the production, storage and presentation of farm products on marketing methods has application to this country. One important shortcoming, to my mind, is the scant discussion it gives to the effect of seasonality of demand on marketing compared with the full discussion of the seasonality of supply of products by farmers.

The book is likely to be of most use to students in providing a useful introduction to the techniques used in marketing research; farmers and marketing organizations will find it interesting in that it indicates possible future developments in this country.

K.E.G.

Observer's Handbook. (3rd Edition). METEOROLOGICAL OFFICE, (805). H.M.S.O., 1969. 40*s*.

The Observer's Handbook is intended to help meteorological observers keep good records which are comparable with those from similar stations. It should, therefore, be regarded as a specialist's book and not of particular interest to the general reader. As all routine observations must be made in a standard manner, much of the book is devoted to descriptions of the instruments which should be used, the manner in which they are exposed and the methods of taking the observations. These are dealt with element by element in the individual chapters, for example, a chapter on clouds is followed by one on visibility and then one on weather which details how a variety of phenomena ranging from freezing drizzle to duststorms may be represented symbolically by Beaufort letters or international symbols. These are followed by other chapters on such topics as precipitation and sunshine and, finally, one with the intriguing title of special phenomena. This is largely concerned with optical phenomena; the various halos which are formed by the refraction and reflection of light by ice crystals suspended in the atmosphere. Coronae, on the other hand, are caused by the diffraction of light by very small water drops and they are often confused with halos. This is unfortunate as weather lore associates halos with rain and there is some physical basis for this, but not if the so-called halo is a corona.

Among the many technical tables in the Appendix, one brings out the generally unappreciated fact that the sun does not necessarily reach its highest point at noon. Along the Greenwich meridian this varies from 1143 to 1215 G.M.T.

The book has a number of black-and-white plates to support the text; many of these relate to cloud and would be more striking in colour. It is well indexed and there is no doubt that it succeeds in its aim of providing a comprehensive reference book for the observer. There cannot be many questions which are not answered somewhere in the text.

W.H.H.

Fruit Crops. J. B. DUGGAN. Macdonald, 1969. 21*s*.

This book is one of a series written especially for students who are taking the City and Guilds of London examination in Horticulture, Stage I, but it is also intended as an introduction to others starting to study commercial fruit growing.

The introductory chapters deal with the choice of situation, site and soil, rootstocks and their effects and the raising of fruit trees and other plants. Further chapters deal with such important subjects as pollination, planning and planting the orchard and fruit tree training.

There are individual chapters dealing with apples and pears, plums, black currants, raspberries and strawberries. All these deal clearly with basic facts and serve their purpose well as an introduction to the subject. Finally, there is an appendix dealing with spray materials.

The text is clear and to the point and the whole book is very well-illustrated with both drawings and photographs, is generally very well-printed and free from errors.

Perhaps the only point which will need correcting in a future edition is the recommendation for the control of bacterial canker in plums. This disease cannot be controlled by autumn-applied sprays of copper as in the case of bacterial canker in cherries. Since much of the infection with plums occurs in the main stem, susceptible varieties are best high-worked on the canker-resistant rootstock such as Myrobalan B.

F.A.R.

The Ministry's Publications

Since the list published in the October, 1969, issue of *Agriculture* (p. 521) the following publications have been issued.

MAJOR PUBLICATIONS

BULLETIN

No. 60. Asparagus (Revised) 4*s*. (by post 4*s*. 4*d*.)
(SBN 11 240360 3)

OUT OF SERIES

No. 20. Experimental Horticulture (New) 9*s*. 6*d*. (by post 10*s*.)
(SBN 11 240810 9)

Report on the Animal Health Services in Great Britain 1967. (New) 10*s*. 6*d*. (by post 11*s*. 2*d*.) (SBN 11 240995 4)

The following publications are available only from the Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex, HA5 2DT. These publications are not for re-sale.

Agricultural Marketing Act 1958. Proposed amendment to the Milk Marketing Scheme 1933 (as amended). Report by David J. Stinson, Esq. on the Public Inquiry held on 4th and 5th June, 1969 (New) 15*s*. 6*d*. (by post 16*s*. 3*d*.)

Types of Farming Maps of England and Wales, 1969 (New) 5*s*. including postage

FREE ISSUES

ADVISORY LEAFLETS

No. 30. Caterpillars on Currants and Gooseberry (Revised)
(Formerly Currant and Gooseberry Sawflies)

No. 91. Beet Leaf Miner (Revised)
(Formerly Mangel Flies)

No. 177. Wheat Bulb Fly (Revised)

No. 382. Brewers Grains (Revised)

No. 421. Cereal Cyst Eelworm (Revised)

SHORT TERM LEAFLETS

No. 93. Maize (New)

No. 94. Sowing Cereals (New

Priced publications, except where otherwise stated, are obtainable from Government Bookshops (addresses on p. 580) or through any bookseller. Single copies of the free items are obtainable from the Ministry (Publications), Tolcarne Drive, Pinner, Middlesex, HA5 2DT.

Agricultural Chemicals Approval Scheme

Seventh List of Additions to the 1969 List of Approved Products for Farmers and Growers

CARBARYL
Wettable Powders
Wormkiller M and B—May and Baker
(a formulation for use on turf for the control of earthworms)

METHIOCARB
Dry Baits
Draza G. Micropellets (Glasshouse crops)—**Pan Britannica**

ZINEB
Wettable Powders
Tiezene W.P. 70—Weil

Company Information

The following firm has recently joined the Agricultural Chemicals Approval Scheme:

Joseph Weil and Son Ltd.,
Friars House,
39-41 New Broad Street,
London, E.C.2
Tel.: **01-588 5052**

Changes of Address

BASF United Kingdom Ltd.,
Agricultural Department,
St. Francis Tower,
Greyfriars,
Ipswich, Suffolk. *Tel:* Ipswich 59581

R. H. Brookes Ltd.,
Beckford,
Tewkesbury, Glos. *Tel:* Ashton-under-Hill 561

Shellstar Ltd.,
Ince Marshes,
Ince,
Chester CH2 4LB. *Tel:* Helsby 2777

Eighth List of Additions to Supplement No. 1 of Chemicals for the Gardener

BAYWOOD DRAZA SLUG KILLER
A pelleted bait, based on methiocarb, for the control of slugs, snails and leatherjackets—**Baywood**

OVAMORT SPECIAL
A DNOC in petroleum oil winter wash for fruit trees and bushes—**Murphy**

PBI SLUG GARD
A pelleted bait, based on methiocarb, for the control of slugs, snails and leatherjackets—**Pan Britannica**

WORM KILLER M and B
A formulation of cabaryl for killing earthworms in lawns—**May and Baker**

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Bacteriological Techniques for Dairy Purposes

The bulletin contains a useful historical introduction, sections giving the technical details for preparing glassware and bacteriological media and standard methods for the examination of raw and pasteurized milk, milk rinses and swabs of dairy equipment and farm water supplies. The appendices contain recommendations for the application of bacteriological advisory work in relation to modern methods of milk production.
(*Technical Bulletin No. 17*) 13*s.* 6*d.* (by post 14*s.* 6*d.*)

Grass and Clover Crops for Seed

Describes the origin in Britain of the growing of, and trade in, grasses, clovers and some other legumes for seed and contains sections on the quality and differences in growth and development of herbage seeds, on their usefulness as an economic cash crop in arable rotation and on sowing, management and storage. Chapters deal with weeds in seed crops, both as regards control in the field and the requirements under the Seeds Act, and with the types, effects and control of diseases and pests which may attack crops and reduce yield.
(*Bulletin No. 204*) 7*s.* 9*d.* (by post 8*s.* 3*d.*)

A free list of agricultural and horticultural titles is available from Her Majesty's Stationery Office, (P6A), Atlantic House, Holborn Viaduct, London EC1

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£3,185—£5,025/Argentina

To lecture at the Catholic University of Buenos Aires, in English and later in Spanish, and to carry out practical research work at the University's farm at Baradero and possibly to build up a post-graduate school. They should be 33-38, approaching senior lecturer level with an M.Sc. and at least five years' teaching and research experience at university farm level. A Ph.D. and a working knowledge of Spanish is desirable. Emoluments quoted above inc ude a variable tax free overseas allowance of £685—£1,525. Contract 1 year with possibility of extension for a second year.

PLANT PROTECTION ADVISER

£1,935—£3,485/St. Vincent

To investigate major diseases of plants and to make recommendations on economic control; to initiate essential applied investigation; to assist in the training of local research and extension staff in disease recognition and control, and to be available for advisory services in the Windward Islands as a group. He should be a qualified plant pathologist, with experience in the tropics, an interest in entomology, and some knowledge of nematology. Emoluments quoted above include a variable tax-free overseas allowance of £435—£1,085.

AGRICULTURAL CHEMIST

£1,785—£3,383/Zambia

To assist entomological research in stored products problems, investigating problems of food in rural areas, including the investigation and application of pest control measures. He must have a degree in chemistry with post-graduate experience in the analysis of insecticidal residues. Emoluments quoted above include a supplement, normally tax free, of £233—£350. A gratuity, normally tax free, of 25% of emoluments (excluding supplement) is also payable.

SOIL SURVEYOR

£1,520—£3,316/Swaziland

To undertake detailed soil surveys of irrigation projects, rural development areas, farms or estates and land capability studies of specific farming systems. He will work in close liaison with the Land Planning Officer and extension staff. He must have a degree in one of the natural sciences or in agriculture and post-graduate experience in soil surveying. Emoluments quoted above include an inducement allowance, normally tax free, of £204—£516 p.a. A gratuity of 25% of total emoluments is also payable.

RESEARCH OFFICER (HORTICULTURE)

£1,737—£3,316/Swaziland

To undertake a research programme on horticultural crops to determine optimum varieties and cultural techniques, with emphasis on vegetables suitable for processing and the fresh market. He should have a degree in agriculture, horticulture or natural science with experience or qualifications in field experimentation and experience in sub-tropical and temperate horticultural crops. Emoluments quoted above include an inducement allowance, normally tax free, of £288—£516. A gratuity of 25% of total emoluments is also payable.

AGRONOMIST

£1,758—£3,154/B.S.I.P.

To take charge of the joint coconut research scheme in the British Solomon Islands Protectorate; to design layout and analyse trials on all aspects of coconut agronomy and to carry out an approved programme of coconut breading and related experiments. He should have a degree in agriculture with experience of tropical crops, partilarly coconuts, and a knowledge of statistical techniques. Emoluments quoted above include an inducement allowance, normally tax free, of £716—£1,160. A gratuity of 25% of total emoluments is also payable.

AGRICULTURAL OFFICERS

£1,692—£3,047/Kenya

To undertake work connected with the I.D.A. Smallholders Credit Project, including staff training field supervision, co-ordination of the project, liaison with other Ministries, and planning. They must have a degree in agriculture with experience and/or training in farm management.

Emoluments quoted above include an inducement allowance, normally tax free, of £716—£958. A gratuity of 25% of total emoluments is also payable

SENIOR AGRICULTURAL ECONOMIST

£2,871—£2,931/Malawi

For supervision of work of agricultural and planning economists within the Planning Unit of the Malawi Ministry of Agriculture To assume responsibility for agro-economic studies, including the supervision of field surveys and the interpretation of their findings for use in formulating agricultural policy. He must have a good degree in agricultural economics with a bias towards micro-economic aspects of agriculture and experience of farm management studies or the planning of agricultural development projects in developing countries. Emoluments quoted above include a supplement, normally tax free of £216–£276. A gratuity, normally tax free, of 25% of emoluments (excluding supplement) is payable on completion of tour of not less than 30 months.

AGRICULTURAL RESEARCH OFFICERS

£1,391—£2,876/Malawi

Post A: To continue an established maize breeding programme for the production of higher yielding composite, hybrid and synthetic maize varieties.

Post B: To establish a breeding programme on Western tobacco for yield and quality improvement and to introduce disease resistance to alternaria longpipes.

Both Posts: They must have a degree in agriculture or botany with postgraduate training in plant breeding. Emoluments quoted above include a supplement, normally tax free, of £216—£276. A gratuity of 25% of emoluments (excluding supplement) is payable on completion of tour of not less than 30 months.

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£3,818/Uganda

To take full charge of all agricultural research work in Uganda, including the operation of two main research centres, the co-ordination of work between these centres and the regions they serve and the maintenance of contact with other agricultural research work throughout East Africa and other parts of the world. He must have an honours degree with appropriate postgraduate training and experience in research. Emoluments quoted above include an inducement allowance, normally tax free, of £1,018 p.a. A gratuity of 25% of total emoluments is also payable. Contract 21—27 months.

BIOMETRICIAN

£1,610—3,403/Zambia

For duties at the Forestry Research Station, Kitwe, he must have a degree in statistics or mathematical statistics. Experience of agricultural or forestry work and/or a knowledge of agricultural variants, regression techniques, multivariant methods and computer applications an advantage. Emoluments quoted above include a supplement, normally tax free, of £233—350. A gratuity, normally tax free, of 25% of emoluments (excluding supplement) is also payable.

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MINISTRY OF OVERSEAS DEVELOPMENT

RECENT PUBLICATIONS

Lime and Liming

The purpose of this bulletin, now in its sixth edition, is to promote better understanding of the value of liming and, by providing information based on scientific knowledge and practical experience, to help the farmer in working out his liming policy. The new basis of evaluation of soil liming materials in terms of neutralizing value is explained and particulars from the new Regulations under the Fertilisers and Feeding Stuffs Acts are given.

(Bulletin No. 35) **5s. 6d.** (by post 6*s.*)

Infestation Control

Report of the Infestation Control Laboratory for 1965–67

The fourth report of the work of the Infestation Control Laboratory (ICL), covering the three years ending 31st December, 1967. This illustrated account deals with the control of insect and allied pests of stored products and with research and development work on harmful vertebrate pests.

14s. 6d. (by post 15*s.* 4*d.*)

A Guide to Official Sources

Designed to provide a guide to current statistical series relating to agriculture, fisheries and food, while at the same time giving an account of the more important changes which have affected the main series since the mid-1950s. The booklet, which supersedes the first edition published in 1958, deals primarily with economic as opposed to technical statistics.

(Studies in Official Statistics No. 14) **12s. 6d.** (by post 13*s.* 2*d.*)

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